THE HOTEL AND MOTEL FIRE SAFETY ACT OF 1989

HEARING

BEFORE THE

SUBCOMMITTEE ON
SCIENCE, RESEARCH AND TECHNOLOGY

OF THE

COMMITTEE ON
SCIENCE, SPACE, AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

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THE HOTEL AND MOTEL FIRE SAFETY ACT OF 1989

THURSDAY, MARCH 2, 1989

House of Representatives,
Committee on Science, Space, and Technology,
Subcommittee on Science, Research and Technology,
Washington, D.C.

The subcommittee met, pursuant to call, at 1:05 p.m., in room 2318, Rayburn House Office Building, Hon. Doug Walgren [chairman of the subcommittee] presiding.

Mr. Walgren. Let me call us together and begin our hearing today on H.R. 94, the Hotel and Motel Fire Safety Act of 1989.

As those who have followed this area know, this bill is one which we introduced in the last Congress and which we have together, Congressman Boehlert and myself and others, reintroduced in this Congress because it is such a critical area that the Congress should focus on and where we have to make some progress because of the lives that are being lost to fire across this country.

The other week in Bethlehem, Pennsylvania, there was a fire in a hotel room in a very lovely and central hotel in that town. Five people died in that incident. One of the most striking things about that was, none of the people who died were in a room that was touched by flame. They were killed by smoke that had moved from the room where all the flame was contained, and the people that were in the room that burned got out. But, nonetheless, five people lost their lives, and somehow or other we have to understand the importance of the combination of sprinklers that would prevent that kind of fire from happening in the first place or far more effective smoke alarm system than we have now in hotels across the country.

This committee started this initiative in response to the Dupont Plaza Hotel fire on New Year's Eve in 1986 where almost 100 people died within 12 minutes, a fire that, had there been a sprinkler, never would have caused one casualty. The same is, of course, true for the Bethlehem hotel fire. Had there been a sprinkler system, there never would have been any lives lost in that fire, and we have an obligation to our constituents who assume when they travel that up-to-date fire protection will be in place in any hotel in which they choose to sleep, and that's an assumption, it's a human assumption, it's an assumption we all make, but it's an assumption that is sadly misplaced.

A survey of American hotels through the Hotel/Motel Association found that less than half of the hotel rooms in the Nation have sprinklers, and I would assume that they all would. As I say, that's an assumption that I and most of the public make that is misplaced.

The hearing today on H.R. 94 would try to encourage hotels to install what now are simple and affordable fire safety equipment, and we would use the Federal travel bills that are incurred by Federal employees to set the standard for hotel fire safety across the country, and that would then be a standard that I'm sure many other hotels in the area who may not be directly driven by Federal travel and the need to have access to Federal employees and their service—would set the standard that they would then live up to.

We passed this bill in the last Congress with Congressman Boehlert, the ranking minority member, and Congressman Lujan, who has now gone on to become Secretary of the Interior in the new administration, and we're going to pass it in this Congress, and we are going to be certain that this kind of legislation has the attention of the Congress and, with the kind of support we had last time in the House, if we transmit that to the Senate, this is going to become the law of the land, and people will no longer, in the long run, be making an assumption with their life that turns out to be wrongly placed.

Well, with that, I'd like to recognize the ranking minority member of the committee, who has been so involved in this issue, and it is truly his bill in this Congress, and I am one of the original cosponsors, but the real driving force for this bill in this Congress is the gentleman from New York, Mr. Boehlert.

Mr. **Boehlert**. Thank you, Mr. Chairman. I want to thank you for your leadership and for being very prompt in scheduling this hearing and accelerating the pace that we are committing ourselves to.

I'm going to open this hearing with the same appalling statistic we've used time and time again because too many people seem to just shrug it off. The United States has the highest rate of loss of life and property due to fire in the industrialized world. Think about that. The most advanced, the most affluent, the most dynamic nation in the world has the highest rate of loss of life and property due to fire anywhere.

Our attitude toward this startling fact reminds me of the Soviet line on its agriculture disasters. You know, year after year the Soviet government would look out over the empty fields and say, "Don't know what happened here. Must be the weather or something." Western economists used to joke that the Soviets blamed their repeated crop failures for 70 years on bad luck. Then along came Mikhail Gorbachev who admitted the obvious: 70 years of bad harvests were not the result of bad luck, but they were the result of bad policy; and, guess what? No matter how much we try to pretend otherwise, our harvest of death from fire is not the result of bad luck but of bad policy.

Those 97 people at the Dupont Plaza Hotel who were scorched to death by a fireball in 12 gruesome minutes were not the victims of bad luck. The five people who perished last month in Bethlehem, Pennsylvania, because an iron was left on were not the victims of bad luck. They are dead because of bad policy.

Indeed, the way we handle fire safety pretty much defines bad policy. We have the simple, affordable, proven means to prevent death, but we just don't bother to use them.

I should note that fire safety is unique in this respect in American life. When we find that a product can cause cancer, even if the risk is small or long-term, we pull it from the shelves. If a product can cause injury, even if only through misuse, we pull it from the shelves. If equipment can improve auto safety, we mandate its use.

Americans rightly expect the Government to provide a basic level of safety, and it's only in the area of fire safety that we are unwilling to take even the most preliminary steps.

The car safety analogy is particularly apt. It is my understanding that in the 1960's the General Services Administration started to buy only cars with seat belts. These cars cost more, we know that, but they protected Federal employees, and they encouraged car manufacturers to install seat belts and set an example for the public.

So you see, unlike Mikhail Gorbachev, we don't have to break with past policy to end our harvest of death. The bill would not even make the Federal Government a pace-setter in hotel fire safety. Several corporations already forbid their employees to stay in unprotected hotels. Cigna Corporation, for example, the insurance conglomerate, testified last year that its ban on employee travel had caused several hotels to install sprinklers, and that's just one company. Imagine what the billion-dollar purchasing power of the Federal Government could accomplish.

Mr. Chairman, we're not asking for any radical policy shift in this bill, we just want to provide what Federal employees and the rest of the public already expect, safe accommodations. The Federal Government has the wherewithal to improve fire safety. I just don't see how we can responsibly fail to use it.

Thank you, Mr. Chairman.

Mr. WALGREN. Thank you, Mr. Boehlert.

The chair would like to recognize others for opening comments. Mr. Ritter.

Mr. RITTER. Thank you, Mr. Chairman, and I want to commend you and the ranking member for yeoman work in the area of fire safety, not just with this bill but in this subcommittee and full committee over the years. I think those involved in fire safety across the country can be very proud of the kind of work that's gone on, really, under the leadership of the gentleman from Pennsylvania, Mr. Walgren, and the gentleman from New York, Mr. Boehlert, and we're here today to consider a very important bill, H.R. 94, the Hotel and Motel Fire Safety Act.

More than half of the hotels and motels in this country lack sprinklers, and the specter of potential losses of life, injury, and property damage haunts each and every one of these underprotected hotels and motels.

As has been mentioned, on January 28 in my Congressional district, there was a tragic reminder of the destructive force of hotel fire. A fire at the Hotel Bethlehem in Bethlehem, Pennsylvania, caused five people to lose their lives. Twelve others were injured in the blaze, and there was extensive property damage.

I'm grateful for your work, Mr. Chairman, and to you, Mr. Boehlert, for your recognition that, in view of the Hotel Bethlehem fire and similar incidents, we need to take necessary steps to encourage hotels to protect themselves against potential disasters.

Mr. Chairman, the Hotel Bethlehem fire was a terrible blow to the city of Bethlehem and to our area, and few people here want to find a solution to this safety problem more than I do. I'm also concerned about the impact of this legislation on certain established hotels, usually smaller, usually older, usually privately owned, which may not be able to accomplish easily what has been described as simple retrofitting of sprinklers and similar safety devices. They don't have to comply with the provisions of H.R. 94, but some might lose considerable portions of their business if they don't.

Perhaps, Mr. Chairman and Mr. Boehlert, we could solve that problem with language in the bill, but we should make sure that in a desire to do something about the fire safety problem we look not only at our primary concern, and that must always be our primary concern, the potential for disastrous, endangering fires, but also at the way that hundreds of small business hotels and motels would be covered.

Thank you for this opportunity to address the subject, Mr. Chairman, and I know that you and Mr. Boehlert will continue to provide keen leadership in the area. I hope that we move forward in this important area of safety.

Mr. WALGREN. Thank you, Mr. Ritter.

The chair recognizes the gentlewoman from Maryland, Mrs. Morella.

Mrs. MORELLA. Thank you. Thank you, Mr. Chairman.

I just want to commend you and the ranking member of the committee for introducing this bill again, and I know Mr. Walker is here, who was involved in the initial introduction, and most of us are cosponsors.

I think this is a very important bill, because I think Government has a responsibility to try to protect the safety of its citizenry, and I, for one, appreciate very much the initiatives or, I should say, the sanctions involved in promoting sprinklers and smoke alarms in hotels because I probably represent more Federal employees than any other single Member of Congress. Easily, there are about 68,000 employees who live in Maryland's Eighth Congressional District, and that's not counting the about 26,000 retirees that we have who have worked for the Federal Government, and so I applaud you for the creative way of providing an incentive to promote the safety of all our people.

So I look forward to listening to the testimony, but I must say, I start off already believing that this is a good bill.

Thank you, Mr. Chairman.

Mr. WALGREN. Thank you, Mrs. Morella.

The gentleman from Pennsylvania, Mr. Walker.

Mr. WALKER. Thank you, Mr. Chairman, and I, too, join with my colleagues in thanking you and Mr. Boehlert for the leadership that you've shown in this issue, and I'm very proud to be a cosponsor of the bill.

I think there are a number of things that we can look at in the bill. There are certainly modifications that we can look at if that's needed in order to make it a better bill along the way, but I think that this is the working document, and it's a good start.

I think it comes from two angles. First of all, we want to protect the people who stay in hotels, and that involves a large portion of our population who travel these days, and we can be helpful on that. But a lot of us represent districts where the large portion of firefighters in those districts are volunteer firefighters. Every fire that we can prevent means that that's one less risk for those volunteers that go into life-threatening situations, and so I'm hopeful that we can move this bill forward as a way of saying, not only to the traveling public that you're protected, but also, saying to the firemen who perform such a beneficial function for our communities that we're also thinking about meeting the needs of prevention of fires in this Congress so that you are not faced with danger unnecessarily, and I thank you very much.

Mr. WALGREN. Thank you, Mr. Walker.

Well, let's turn to our first panel: Edward Wall, the Deputy Administrator for the U.S. Fire Administration under FEMA; and, along with Mr. Wall, William McDade, the Acting Assistant Commissioner for Transportation and Related Responsibilities with the General Services Administration.

We welcome you both to our process. Know that written statements will be made and reproduced in the record, regardless of the direction your oral presentation takes, and you can feel free to diverge, or underscore, or focus on particular points that you think should be raised and should be carefully considered.

So let me recognize first Mr. Wall for your testimony.

STATEMENTS OF EDWARD M. WALL, DEPUTY ADMINISTRATOR, U.S. FIRE ADMINISTRATION, FEDERAL EMERGENCY MANAGEMENT AGENCY, WASHINGTON, D.C.; AND WILLIAM McDADE, ACTING ASSISTANT COMMISSIONER, OFFICE OF TRANSPORTATION AND PROPERTY MANAGEMENT, FEDERAL SUPPLY SERVICE, GENERAL SERVICES ADMINISTRATION, WASHINGTON, D.C.

Mr. WALL. Good afternoon, Mr. Walgren. It's a pleasure to be before the subcommittee today. Mr. Bragdon sends his regrets that he wasn't able to appear before you today, that he's out on the coast.

I am Edward Wall, the Deputy Administrator of the United States Fire Administration, and I'd like to offer the views of the United States Fire Administration on H.R. 94, the Hotel/Motel Fire Safety Act of 1989.

In any enterprise, human resources are the most valuable asset which an organization can bring to bear, and this is no less true for Government than it is for the private sector. The bill's intent to protect the valuable resources from the perils of fire is quite commendable.

You will hear data presented here today that will reflect the significant strides which have already been achieved by the lodging industry in providing a fire-safe environment for the traveling public. These efforts have been encouraged and, in some measures, prompted by the interest which the Congress and this committee have taken in promoting fire safety.

Sprinkler systems and detection and alarm systems, when they are coupled with the provisions of building codes, are extremely effective in preventing the loss of life due to fire. Where this protection is afforded, the threat to life diminishes almost to the vanishing point. The record achieved by full fire protection systems, coupled with fire-safe construction features, have made such protected facilities among the most fire-safe in the world. The tragic losses of life which occurred at the MGM Grand and the Dupont Plaza, that I happen to have led the Federal team to investigate to assist the ATF and the FBI that tragic weekend, happened in hotels which lacked this full protection.

The issue is not whether this protection ought to be provided but, rather, how provisions of this protection ought to be achieved. The Federal travel budget is one way to encourage the lodging industry to upgrade fire protection, and this is particularly true because it complements the savings that the provision of such protection produces for the lodging industry. These savings, due to lower insurance premiums, allow for cost recovery long before the economic life of such safety systems are reached.

The Federal Emergency Management Agency, of which the United States Fire Administration is an operational component, has an internal policy of encouraging FEMA travelers to seek fire-safe accommodations as they travel about on agency business. We believe improved information, on which lodging establishments provide this vital protection, will promote the fire safety of the Federal traveler and the traveling public at large.

I again wish to thank the committee for their leadership in promoting fire safety. I commend the lodging industry for their progress in enhancing life safety to the traveling public. We in the United States Fire Administration have and will continue to do all we can to see to the continuation of these trends.

We fully support the principles of this bill. Our only reservation is how best to achieve the results of fire-safe lodging which we all desire. We believe it is important to preserve the prerogatives of the States and the locals in setting fire safety codes. Nevertheless, the United States Fire Administration stands ready to work with other Federal Government offices and with the appropriate standard-setting bodies for guidelines for fire-safe lodging. We believe this approach will be an appropriate and constructive Federal step to enhance fire safety.

It is our understanding that the General Services Administration travel guide, used by, I understand, some 80 percent of Federal travelers, will be updated to clearly inform the Federal traveler of the degree of fire safety of his or her lodgings. We believe that these steps will go far to continue the trends toward fire safety that are operating today in the lodging industry.

Those conclude my remarks, and I'd be very happy to answer any questions that the subcommittee may have.

[The prepared statement of Mr. Wall follows:]

STATEMENT OF

EDWARD M. WALL
DEPUTY ADMINISTRATOR
UNITED STATES FIRE ADMINISTRATION
FEDERAL EMERGENCY MANAGEMENT AGENCY
BEFORE
THE SUBCOMMITTEE ON SCIENCE, RESEARCH, AND TECHNOLOGY
OF THE
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
HOUSE OF REPRESENTATIVES
MARCH 2, 1989

I am Edward Wall, Deputy Administrator of the United States Fire Administration. I would like to offer the views of the United States Fire Administration on H.R. 94, the Hotel/Motel Fire Safety Act of 1989.

In any enterprise, human resources are the most valuable asset which the organization can bring to bear. This is no less true for government than for the private sector. This bill's intent, to protect this valuable resource from the perils of fire, is commendable.

You will hear data presented here today which will reflect the significant stride which has been achieved by the lodging industry in providing a fire safe environment for the traveling public. These efforts have been encouraged, and in some measures prompted, by the interest which the Congress and this committee have taken in promoting fire safety.

The effectiveness of sprinkler systems and detection and alarm systems when coupled with the provisions of model building codes in preventing life loss due to fire is exemplary. Where this protection is afforded, the threat to life diminishes almost to the vanishing point. The record achieved by full fire protection systems, coupled with fire safe construction features, have made these facilities among the most fire safe in the world. The tragic loss of life which occurred in MGM Grand and the Dupont Plaza happened in hotels which lacked this protection.

The issue is not whether or not this protection ought to be provided, but rather how provision of this protection ought to be achieved. The Federal travel budget is a very effective lever to encourage the lodging industry to upgrade fire protection. This is particularly true when the provision of such protection when viewed in the broader economic context of potential insurance savings which allows for cost recovery long before the economic life of such systems are reached. The Federal Emergency Management Agency, of which the United States Fire Administration is an operational component, has an internal policy of encouraging FEMA travellers to seek out fire safe accommodations as they travel on agency business. We believe that the articulation of this policy government wide, coupled with improved information on which lodging establishments provide this vital protection, will promote the safety of the Federal traveller and the travel safety of the citizen at large.

I again wish to thank this committee for their leadership in promoting fire safety. I commend the lodging industry for their progress in enhancing the fire safety of the traveling public. We in the U.S. Fire Administration have and will continue to do all that we can to see the continuation of these trends.

We fully support the principal of this bill. Our only reservation is how best to achieve the results of fire safe lodging which we all desire. The United States Fire Administration stands ready to issue guidelines as to what constitutes fire safe lodging. It is our understanding that the General Services Administration travel guide, used by some 80% of Federal travelers, will be updated to clearly inform the Federal traveller of the degree of fire safety of his or her lodging. We believe that these steps will go far to continue the trends toward fire safety that are operating in the lodging industry.

I would be happy to answer any questions which you might have.

Mr. Walgren. Thank you, Mr. Wall. We appreciate that, and we'll turn then to Mr. McDade.

Mr. McDade. Mr. Chairman, I'm William McDade, Acting Assistant Commissioner, Office of Transportation and Property Management for the Federal Supply Service within the General Services Administration, and I appreciate this opportunity to testify on H. R. 94.

The primary purpose of this bill is to promote fire safety by amending the Federal Fire Prevention and Control Act of 1974 to allow for the development and issuance of guidelines concerning the use and installation of automatic sprinkler systems and smoke alarms in places of public accommodation affecting commerce and to limit lodging reimbursement of Federal employees traveling on official business to establishments with specific fire safety devices.

While we support the concept of this legislation to improve fire safety, we believe that this purpose can be served by actions of the Federal Government within the existing authorities that will be less burdensome and less costly than this bill. Accordingly and for the specific reasons stated below, we will oppose H.R. 94.

GSA defers to the views of the Federal Emergency Management Agency—FEMA—concerning the issuance of guidelines as required by section 3 of the bill. However, GSA opposes sections 4 and 5 of H.R. 94. First, GSA opposes the reimbursement denial provision imposed upon Federal civilian travelers in section 4 of H.R. 94. Our specific objections to section 4 are as follows:

Section 4 of the bill would deny lodging expense reimbursement to any Federal civilian employee traveling on official business for lodging obtained in any hotel, motel, or other place of public accommodation that is subject to but not in compliance with the fire safety provisions imposed by H.R. 94. The bill would permit only one exception to this rule and allow reimbursement to Federal employees when a lodging establishment with an appropriate sprinkler system is not available within a reasonable distance of the place of official business, as determined in accordance with regulations prescribed by the Administrator of General Services.

GSA believes that prohibiting reimbursements to Federal employees is an inappropriate method of enforcing lodging establishment compliance with the fire safety standards. While we share the concern driving the bill for the safety of Federal employees, the bill ultimately imposes a potential financial hardship upon those same employees by restricting lodging establishment selections when they perform official travel.

GSA believes that section 4 raises serious policy issues that impact the Federal traveler. In particular, we are concerned that the negative implications of denying travel reimbursement to a private citizen who has been either invited or requested to perform official business with the Government and is thus subject to the Federal Travel Regulation, could ultimately prove detrimental to Government programs.

Section 4 also raises an issue with respect to employees performing extended temporary duty. For example, if an employee on extended temporary duty, which could span several months, inadvertently negotiates a long-term rental with an establishment that is not on the master list of approved facilities, the employee would be out of pocket a substantial and unreasonable sum of money since the reimbursement prohibition allows exceptions only for distance. This could create extreme hardship cases with no means of administrative relief and could also present difficulties in Federal agency implementation.

Moreover, GSA notes that the bill creates an additional inequity by targeting only Federal civilian employees as the vehicle for leveraging enforcement of the lodging establishment compliance with the fire safety standards contained in H.R. 94.

Finally, section 4 would impose a substantial administrative burden upon Federal agencies by requiring them to verify employee compliance with the approved list of accommodations when approving reimbursement. This would cause the addition of a time consuming and costly step to the voucher approval process. GSA believes that ensuring the compliance of infrequent travelers and invitees—non-Government employees performing official business for the Federal Government—would prove particularly difficult.

Thus far, we have focused our attention on the reimbursement prohibition in section 4. We note that there is a second provision found at section 5(a) which concerns Federal travelers. Section 5(a) of H.R. 94 would require an adjustment to the per diem rate-setting methodology to consider only lodging establishments that are in compliance with the new fire safety standards.

While we believe that section 5(a) is necessary to provide adequate reimbursement to employees required to comply with section 4, GSA notes that implementation of these provisions would have a significant cost impact. GSA estimates that enactment of the provisions would result in a $99 million increase in overall costs to the Government. That's an annual increase.

In lieu of the approach in section 5(a), GSA believes that other, less costly alternatives to this proposal should be explored. For example, GSA intends to revise its Federal travel directory to show which hotels/motels with which the Government presently has negotiated rate agreements are equipped with sprinklers. Currently, this directory indicates establishments with smoke alarms or sprinklers without distinguishing between the two.

This approach has a number of advantages. By asking hotels/motels whether they have sprinklers, GSA is alerting operators that the Government believes sprinklers are important. At the same time, it gives Federal employees better information upon which informed decisions could be made as to appropriate lodgings. We think this approach will provide similar incentives to those in the bill, at less cost, to promote development of better fire safety measures.

In conclusion, GSA supports the goal of the bill to encourage fire safety in hotel/motel accommodations. The Federal Government should, to the maximum degree possible, take measures to ensure the public safety of all its citizens, but its efforts should not unduly penalize any segment of the citizenry as this bill would do to Federal civilian employees. Safety is a shared responsibility, and the provisions of this bill should be enforced by means available to the Government other than by penalizing the Federal civilian employee when he or she may, in fact, have little or no choice when obtaining lodgings.

This concludes my testimony, Mr. Chairman, and I'd be pleased to answer questions.

[The prepared statement of Mr. McDade follows:]

STATEMENT OF
WILLIAM F. MCDADE
ACTING ASSISTANT COMMISSIONER
OFFICE OF TRANSPORTATION AND PROPERTY MANAGEMENT
FEDERAL SUPPLY SERVICE
GENERAL SERVICES ADMINISTRATION
BEFORE THE
SCIENCE, RESEARCH, AND TECHNOLOGY SUBCOMMITTEE
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
ON H.R. 94, "HOTEL AND MOTEL FIRE SAFETY ACT OF 1989"
MARCH 2, 1989

Mr. Chairman, I am William F. McDade, Acting Assistant Commissioner, Office of Transportation and Property Management, Federal Supply Service, General Services Administration (GSA). I appreciate this opportunity to offer testimony on H.R. 94.

The primary purpose of this bill is to promote fire safety by amending the Federal Fire Prevention and Control Act of 1974 to allow for the development and issuance of guidelines concerning the use and installation of automatic sprinkler systems and smoke detectors in places of public accommodation affecting commerce, and to limit lodging reimbursement of Federal employees traveling on official business to establishments with specific fire safety devices. While we support the concept of this legislation to improve fire safety, we believe this purpose can be served by actions of the Federal Government within existing authority that will be less burdensome and costly than the bill. Accordingly, and for the specific reasons stated below, we oppose H.R. 94.

GSA defers to the views of the Federal Emergency Management Agency (FEMA) concerning the issuance of guidelines as required by section 3 of the bill. However, GSA opposes sections 4 and 5 of H.R. 94. First, GSA opposes the reimbursement denial provision imposed upon Federal civilian travelers in section 4 of H.R. 94. Our specific objections to section 4 are as follows:

Section 4 of the bill would deny lodging expense reimbursement to any Federal civilian employee traveling on official business for lodging obtained at any hotel, motel, or other place of public accommodation that is subject to, but not in compliance with, the fire safety provisions imposed by H.R. 94. The bill would permit only one exception to this rule and allow reimbursement to Federal employees when lodging with an appropriate sprinkler system is not available within a reasonable distance of the place of official business, as determined in accordance with regulations prescribed by the Administrator of General Services.

GSA believes that prohibiting reimbursement to Federal employees is an inappropriate method of enforcing lodging establishment compliance with the fire safety standards imposed by H.R. 94.

While we share the concerns driving the bill for the safety of Federal employees, the bill ultimately imposes a potential financial hardship upon those same employees by restricting lodging establishment selection when they perform official travel.

GSA believes that section 4 raises serious policy issues that impact the Federal traveler. In particular, we are concerned that the negative implications of denying travel reimbursement to a private citizen who has been either invited or requested to perform official business for the Government, and is thus subject to the Federal Travel Regulation, could ultimately prove detrimental to Government programs.

Section 4 also raises an issue with respect to employees performing extended temporary duty (TDY). For example, if an employee on extended TDY (which could span several months) inadvertently negotiates a long-term rental with an establishment that is not on the master list of approved facilities, the employee would be out-of-pocket a substantial and unreasonable sum of money, since the reimbursement prohibition allows exceptions only for distance. This could create extreme hardship cases with no means of administrative relief, and could also present difficulties in Federal agency implementation.

Moreover, GSA notes that the bill creates an additional inequity by targeting only Federal civilian employees as the vehicle for leveraging enforcement of lodging establishment compliance with the fire safety standards contained in H.R. 94.

Finally, section 4 would impose a substantial administrative burden upon Federal agencies by requiring them to verify employee compliance with the approved list of accommodations when approving reimbursement. This would cause the addition of a time-consuming and costly step to the voucher approval process. GSA believes that ensuring the compliance of infrequent travelers and invitees (non-Government employees performing official business for the Federal Government) would prove particularly difficult.

Thus far, we have focused our attention on the reimbursement prohibition in section 4. We note that there is a second provision, found at section 5(a), which concerns Federal travelers. Section 5(a) of H.R. 94 would require an adjustment to the per diem rate-setting methodology to consider only lodging establishments that are in compliance with the new fire safety standards. While we believe that section 5(a) is necessary to provide adequate reimbursement to employees required to comply with section 4, GSA notes that implementation of these provisions would have a significant cost impact. GSA estimates that enactment of the provisions would result in a $99 million increase in overall costs to the Government.

In lieu of the approach in section 5(a), GSA believes that other less costly alternatives to this proposal should be explored. For example, GSA intends to revise its Federal Travel Directory to show which hotels/motels, with which the Government presently has negotiated rate agreements, are equipped with sprinklers. (Currently this directory indicates establishments with smoke detectors or sprinklers without distinguishing between the two.) This approach has a number of advantages. By asking hotels/motels whether they have sprinklers, GSA is alerting operators that the Government believes sprinklers are important. At the same time, it gives Federal employees better information upon which informed decisions could be made as to appropriate lodginge. We think this approach will provide similar incentives to those in the bill, at less cost, to promote development of better fire safety measures.

In conclusion, GSA supports the goal of the bill to encourage fire safety in hotel/motel accommodations. The Federal Government should, to the maximum degree possible, take measures to ensure the public safety of all citizens but its efforts should not unduly penalize any segment of the citizenry as this bill would do to Federal civilian employees. Safety is a shared responsibility and the provisions of this bill should be enforced by means available to the Government other than by penalizing the Federal civilian employee when he/she may, in fact, have little or no choice when obtaining lodging.

This concludes my testimony, Mr. Chairman. I would be pleased to answer questions at this time.

Mr. WALGREN. Thank you, Mr. McDade.

Well, we certainly appreciate the support, in principle, that you and both your agencies are able to give to the direction that this legislation takes, and I realize that in any system that has to have a lot of people on board and in agreement, obviously, there is difficulty getting 100 percent endorsements.

But let me just ask Mr. Wall whether you foresee this bill, as written, as creating any substantial difficulties in implementation from the Fire Administration's role.

Mr. WALL. The burden that would befall the Fire Administration is hard for us to absorb, because our organizational structure at the present time, Mr. Walgren, is so small. You know, our fully authorized strength is 20 people.

Mr. WALGREN. Yes. Well, let's look at the burden that you'd be asked to absorb. The primary part of it would be to develop a guideline with respect to sprinkler safety. Is that not correct?

Mr. WALL. Yes.

Mr. WALGREN. And in doing that, you would be referring to the guidelines in that area that have already been developed by code bodies around the country, and wouldn't it be true that the review and even the process required to satisfy yourself about a safe guideline, given the fact that you're not creating it yourself but are incorporating recommendations made by the private sector—is that really a substantial effort in terms of your agency's abilities over a year or two years?

Mr. WALL. When I analyzed that workload for Mr. Bragdon, I estimated to him that it would probably require two additional people for the early years of the bill and that once the bill was in place and functioning, probably one person to monitor that literally on a full-time basis would be needed.

The difficulty with the guidelines is that although we would be using guidelines that are already promulgated and we wouldn't be going back and inventing the wheel, that we have to be very careful on developing a generic guideline that wouldn't be burdensome to communities that have developed their own, and let's say that we took one guideline that said that all hotels had to comply with NFPA standard 13. That probably would be very burdensome for certain hotel chains who have been very innovative in this area and have fully sprinklered their properties using some variation of that national standard.

So we would have to very carefully scrutinize what would be an acceptable minimum standard for fire safety sprinklers in hotels rather than saying any one national standard that's currently in existence would cover them all.

Mr. WALGREN. So our judgment, essentially, is to weigh how great an effort it would take in an agency such as yourself to pull together the present code guidelines and code requirements with respect to hotel public accommodations and settle on one that can be recommended in good conscience as both least cost effective and yet effective in terms of providing sprinkler protection to hotel residents, and I think that's something that we can—it's certainly within the reach of our own experiences to make some assessment of how expensive and burdensome that task would be.

Thank you very much.

Let me recognize the gentleman from New York, Mr. Boehlert.

Mr. BOEHLERT. Mr. McDade, I want to thank you for coming up here. I know it's a difficult assignment for you in view of the fact that the chairman and I are so deeply committed to this bill, as are members of this committee on both sides of the aisle.

I appreciate your supporting it in principle, but that sort of reminds me of the nation that would support peace in principle and offers discounts on nuclear bombs. I looked at your testimony and, without being too flip, I've shot a lot of holes through it.

Mr. WALGREN. Those are points of light.

Mr. BOEHLERT. Points of light.

Let me take you step by step through your testimony, if I may, because I've had the advantage of an advance copy, and I have some questions that I think would shed some light on this issue. I hope there won't be too much heat. If there is, excuse me, because I'm committed to this.

I start on page 2. Doesn't GSA limit what airlines Federal employees are allowed to travel on even though this sometimes complicates their travel plans, and isn't this their procedure for employees to get around this restriction?

Mr. MCDADE. The limitation on airlines is two-part; one, it has to be an airline that's certified as being safe to fly by the FAA; it's a certifiably usable airline, according to their regulations. That's beyond our control. The second part that limits the airlines that you can use are economic in function. They are those airlines who've seen fit to bid a low enough rate that they would receive the business between city pairs, certain city markets.

Mr. BOEHLERT. But safety is a primary—

Mr. MCDADE. Safety is the same on all of the airlines; there's no discrimination between a particular airline and any other airline as to safety requirements. It's purely economic. The airline that gives us the best price for an acceptable level of service is accorded the business by the Government.

Mr. BOEHLERT. Do you want to add to that?

Mr. MCDADE. What is that, sir?

Mr. BOEHLERT. Did you want to add something?

Mr. MCDADE. No. I said that there's a distinction between the limitation for economic reasons. There is no limitation for safety reasons. We would not allow somebody to get on an airline that's not certified, say—certified competent to perform the service.

Mr. BOEHLERT. I can recall one time in the not too recent past, and I won't name the airline because they've taken corrective action, but at the very time that GSA was requiring all Federal employees to fly on this airline it was under a very thorough investigation by the Federal Aviation Administration for some very things that concern us all about airline safety.

Let's move on to the next question.

Mrs. MORELLA. Will the gentleman yield for a moment?

Mr. BOEHLERT. Yes.

Mrs. MORELLA. Just simply on that point, you say that all of the airlines would be safe that the FAA would approve, but it is on economic grounds that you make determination about with whom the Federal employees will fly. This bill establishes safety grounds. Just as you say FAA says all the planes are safe, this bill will say that the criteria will be—a criterion will be safety. Doesn't that make sense?

Mr. **McDade**. Certainly, and we are saying the same thing in our—

Mrs. **Morella**. No; you're saying you're doing it on economic reasons because you assume they're all safe because they're approved. We're saying they're not all safe, obviously, so let's let, you know, the Federal Government only authorize those that are safe.

Thank you.

Mr. **McDade**. I have no objection.

Mr. **Boehlert**. Mr. McDade, please tell me how the bill would impose a financial hardship on Federal employees. Try to take me through your thinking, your reasoning, on that one.

Mr. **McDade**. Well, for the general type travel, the TDY, the normal three- or four-day trip, the hardship would be probably imposed through inadvertent choice by a particular traveler.

Mr. **Boehlert**. Are you telling me you don't have the capability to have effective communication within the Government of the United States?

Mr. **McDade**. I can't say that it's perfect. I would say that we are going to, whether this bill passes or not, we're going to try to put the information out, and we have been trying to put the information out, which hotels are equipped with fire safety devices. We're going to upgrade what we are calling fire safety devices now that we know better.

Mr. **Boehlert**. But you understand, we're not denying to employees—that's not our attempt. Our attempt is to have employees well informed on which facilities are safe, so that they can stay at those facilities and get fully reimbursed.

Mr. **McDade**. We're saying the same thing, sir. We are saying that we will put in our Federal travel directory—which, incidentally, is probably the most successful instrument we've ever published—we will put in that the particular information that these hotels, with a mark by them, are equipped with the proper fire safety devices, and we will put a notice in the directory and saying the hotels that are not marked by that do not have those fire devices.

Mr. **Boehlert**. The ones that don't—are you going to put a skull and bones after the ones that don't?

Mr. **McDade**. We haven't decided, but we can put anything in that would be appropriate.

Mr. **Boehlert**. But, Mr. McDade, you just told me that you are very proud of it, and I commend you for your pride in your publication; you've got the best travel directory going, you say.

Mr. **McDade**. Yes, sir.

Mr. **Boehlert**. Well, how do you assume it's the best? I mean what gives you that right to say that?

Mr. **McDade**. Proprietary interest probably.

Mr. **Boehlert**. All right. You say it's the best.

Mr. **McDade**. It is.

Mr. **Boehlert**. All right. Then if this bill passes, then that best publication is going to be available to all your employees—right?—and it's going to tell them where to stay.

Mr. McDade. Well, we will make the information available in a lot of ways. The Federal travel directory is just one way. We have bulletins and other communications. We will communicate with the infrastructure of travel managers. In whatever way we can we will put the information out.

Mr. Boehlert. But don't you understand? We're not trying to deny Federal employees anything, we're trying to encourage hotels to be fire safe as much as is humanly possible.

Mr. McDade. Correct.

Mr. Boehlert. I happen to be tired of reading about tragic loss of lives due to fire.

Incidentally, this bill didn't come up because the chairman and I sat in some back room and were lobbied intensively by a lot of special interests, it came up because we sat here in this very room and heard the reports on that tragic Dupont Plaza Hotel fire down in San Juan, Puerto Rico, and we witnessed the film, and we heard the testimony from experts; 97 lives were snuffed out within a period of 12 minutes, and I'll tell you, there wasn't a dry eye in the house when we heard the end of it. That hotel wasn't sprinklered, but guess what? Puerto Rico now has a law requiring sprinklers in hotels.

The same thing happened in Nevada. Do we have to have a tragic loss of life to spur us to action?

Mr. McDade. Well, there's a little difference. I go back to the FAA again and their safety requirements. That is a law that airplanes are requires to have those safety requirements. As I understand it, this bill does not have the impact—the same impact that the FAA safety requirements would have.

Mr. Boehlert. Believe me, Mr. McDade, I would do it in a moment, and I'm sure the chairman and everybody else would support me. I would, in a moment, require hotels coast to coast to have sprinkler systems if we had the jurisdiction. We don't have the jurisdiction. So we had to come up with a creative way to accomplish this legitimate objective.

Mr. McDade. Yes, sir.

Mr. Boehlert. And we discovered, for example, that the Federal Government spends over $1,200,000,000 a year to house Federal employees on official business traveling throughout the United States—that's a pretty good chunk of change—and then we said if we proceed in this manner, then maybe hotels will be spurred to action. And let me parenthetically add, a great number of hotels in America are being most responsible in addressing this issue, and the Marriott Hotel is one that has already sprinklered all of its facilities, not because somebody told them they had to do it, it just made a lot of sense, and this bill makes a lot of sense.

I have some additional questions for you, but there are other members of this panel who are just as interested in getting at you as I am. So I'll be back to you, Mr. McDade.

Mr. McDade. May I say just one thing?

Mr. Boehlert. Sure.

Mr. McDade. We agree with what you're saying, and the part that we really have problems with is the denied reimbursement aspect of the bill. The statement we made about increased costs is, to a certain extent, information that there is a cost to this particular action.

Mr. **Boehlert**. Well, the cost—I mean we can get down to that. I mean you can't justify their cost. Their methodology is crazy. You know it, and so do I. Ninety-nine million dollars—come on, let's be realistic, and no one is going to deny any reimbursement that's legitimate to Federal employees, and the reason we're not going to deny it is because you have the best travel directory in the business; you've just told us that.

I'll yield at this point, Mr. Chairman, but I hope I can get back.

Mr. **Walgren**. We'll have another round for Members and pursue at that time.

The gentlelady from Maryland.

Mrs. **Morella**. Thank you.

I'll also try to make it brief, and I appreciated the testimony of both of you, and I could ask you, Mr. Wall, about the State requirements that you talked about, but I'd rather direct my question to Mr. McDade, because in talking about the travel directory that you have that's been put together, and then in our brief discussion about how the airlines are certified for safety, but you do have a criteria with regard to the economics involved.

You, in your testimony, talked about the—it was the hardship, the administrative burden you would go through in requiring that reimbursement only go to those Federal employees who are in those safe hotels. You are talking about an administrative burden, and yet you already have this Federal Travel Directory with all these great plans for expanding and whatever. You already do this administratively with regard to the airlines. What is the difference? Are you creating something that, in effect, you don't really believe will be there?

Mr. **McDade**. No, there is a real difference there.

First of all, there are no airlines flying that aren't certified. To get off the ground, you have to be certified. The hotels don't really have that. What I'm saying is—and the $99 million really didn't include this administrative burden; there's another cost to that.

What we're saying there is that it would be required by every voucher examiner to look at every hotel and check that against a list to see that it was certified as being properly equipped. If it wasn't, that certifying and disbursing officer could not properly award this reimbursement to the person traveling, and that's expensive. It's a big, lengthy process, it costs millions of dollars a year, and the General Accounting Office has been pointing out the fact that it is a very burdensome thing for a long time, and we sought ways to streamline the process.

Mrs. **Morella**. I cannot quite see that administratively it's going to cause any major problem to simply announce to all Federal employees that this is the list of hotels and motels that they can go to for reimbursement by virtue of protecting their safety.

Then you go on into something. You said it would cause a hardship for Federal employees and that it would be an inequity. It seems to me it would be an inequity for others who don't use those hotels because they won't be safe, and I don't understand what the hardship would be for Federal employees. Can you really defend that?

Mr. **McDade**. There are a lot of things there that you just said.

Mrs. **Morella**. Yes.

Mr. **McDade**. The inequity is that the—only the Federal civilian employee has been singled out for this particular treatment, the military has not. DOD civilians are, but not the military uniformed travelers, nor is any other segment of the traveling public being subject to this, and to simply pick one segment has a certain air of—

Mrs. **Morella**. Ability to be protected—a safety factor. I mean it's so funny because you're talking about an inequity. On the contrary, this is the group of people that will be given the benefit, and we hope others will, of course, follow, because the hotels will understand what's going on.

Mr. **McDade**. No. I think we feel that our—the very fact that we put a skull and cross-bones or whatever—an arrow or whatever—behind this hotel listing in our book will get their attention, and I think it will also get the attention of the employees that travel.

Mrs. **Morella**. I don't think it will, necessarily, when people travel, and I don't think that they're going to look at whether or not there's a smoke detector or whether there's a sprinkler system in a hotel. But if they know they will not be reimbursed, you can be assured that they will look at that. That will be requirement. And so I think that the paperwork you do might look nice, the directory might be great, but I'm not sure that it is really going—that you're going to see significant changes in where people stay by virtue of adding another factor, of looking at a book, where they make up their own mind. But if you say, "This is what we're going to reimburse," I assure you that 98 percent will do it. The 2 percent who don't will do it right after they hear about it and understand that they definitely won't be reimbursed.

I just cannot understand your logic. I appreciate where you're coming from. You don't want any extra burden placed on you or, you know, GSA, but I just think the arguments maybe aren't even specious, but I thank you very much.

Thank you, Mr. Chairman.

Mr. **Walgren**. Thank you, Mrs. Morella.

Mr. Walker.

Mr. **Walker**. Thank you, Mr. Chairman.

I realize that you may have a feeling that it's somewhat hypocritical of all of us who sit here in a room and in a building that's not properly fire safe to be raising this topic, you know, and I've got to admit there is some hypocrisy involved in this. But let me say that I want to build off what Connie Morella said here a minute ago. The whole message to Federal employees right now is, "Sleep cheap," as some of the signs along the road say, because then you get reimbursed and, you know, you get to keep a little bit of the money if you sleep cheap enough, and so on. You know, that's a much better system.

What we're saying is, I think, that we would prefer to have also the idea that you're going to sleep safe, that we have a big investment in Federal employees, and that we want to make certain that they also sleep safe, and I've got to say, as I read down through your testimony, Mr. McDade, you know, it seems to me that you come down in your testimony on the "sleep cheap" side, and that's a concern, because I think that we do have a legitimate reason here to believe that the Federal Government ought to lead the way.

Let me ask you this. When GSA goes out to get an office building, how many pages of requirements do people have to meet in order for you to get an office building?—not just with regard to sprinklers, with regard to everything. I mean in order to have an office to qualify for Federal leasing, there are quite a few requirements, aren't there?

Mr. McDade. I'm sure there are, sir. I'm not qualified to answer that. I'm in a different part of the business.

Mr. Boehlert. Would my colleague yield at this point?

Mr. Walker. Sure, I'll be glad to yield.

Mr. Boehlert. I have served on the Public Buildings Subcommittee of Public Works and Transportation, and let me tell you, if you saw the specs for a couple of Federal buildings proposed to be acquired by GSA, you'd get a hernia just lifting them.

Mr. Walker. That's my understanding, too.

I remember when we had to lease an office for my Congressional office in the district. I mean there was a whole set of specifications that we had to meet in order to get this office. Now, I mean I'm concerned that one of the things in there isn't sprinkler systems, I understand. Isn't that true, Mr. Walls, that one of the things we don't require even for Federal office buildings is for them to be properly fire safe? Isn't that right?

Mr. Wall. We have a lot of space that isn't sprinklered. I'm not exactly sure what the GSA specs call for at the present time.

Mr. Walker. But in this particular instance, I mean we have all kinds of requirements, and all we're saying here for employees to travel is, it seems to me, we expect the hotel that a Federal employee is to stay in to be fire safe. I don't see what the problem on that is.

Mr. McDade. First of all, sir, there is no "sleep cheap" involved in this. The per diem regulation governing reimbursement is not geared to enrich an employee who doesn't spend the money. He is now reimbursed on a lodgings-plus basis. He has to turn in a bill that says, "This is what I spent for my hotel," and it's subject to a maximum amount, and then he is—in addition to the amount of money he's given for his lodging bill, he is allowed a meals and miscellaneous expense which is set. Now he can keep—if he eats at McDonald's, he can still keep the $26 or $34 that he's awarded, but not on the hotel side. That was done in the past when we had a different kind of a reimbursement system, but not any more.

Mr. Walker. And all this bill is saying is, when you pick the hotel, you have to pick one that's properly fire safe. What's wrong with that?

Mr. McDade. That's exactly what we're saying in the Federal travel directory.

Mr. Walker. No, no, no.

Mr. McDade. We're sharing our concerns, sir.

Mr. Walker. No, no. What you're saying to the employee is, "Here are a whole bunch of things, and here's one of the things that you can take into account," but you're really not saying to them that, "This is not a place that we would recommend you stay." You know, there's a big difference, because it does change the mentality about the hotel if someone believes that they're not going to get reimbursed for staying at that hotel. I mean that does change the mentality of someone doing the choosing, doesn't it?

Mr. **McDade**. It does, and—

Mr. **Walker**. Well, isn't that an appropriate thing to do?

Mr. **McDade**. There's a cost to it. That's the point we were making.

Mr. **Walker**. I'm a little confused about that cost. Where is there a cost? I happen to come from a fairly large tourist area. Those hotels have to be very, very competitive in that tourist area. So if you choose the hotel that's next-door that sprinklered compared to the one here that's not, my guess is that the costs are not going to be markedly different or any different at all, because they're in a highly competitive atmosphere. I don't understand how that's going to increase the cost, if I read your testimony correctly, by 7 percent.

Mr. **McDade**. I think it's a little less than that, but let me explain how—

Mr. **Walker**. Well, 100 million of 1.2 billion would be somewhere in the vicinity of 7 percent, I think.

Mr. **McDade**. Okay.

Mr. **Walker**. I mean that's a fairly significant difference that you're saying it's going to be, and I would gather that most people probably stay in chain hotels now, most of which are sprinklered anyway.

Mr. **McDade**. Let me—would you like me to explain how we came up—

Mr. **Walker**. Yes, please.

Mr. **McDade**. Okay, just very quickly.

We were asked the same question last year when the bill was in the House, and inasmuch as we really didn't feel confident to provide this kind of information, other than on a guessing type basis, we hired the Runzheimer Company, which is preeminent in this field, and they do at this time have a contract with us to go out and do the surveys that our per diem reimbursement is based on. We asked them to do it. We issued and negotiated a special contract with them, and they came back with this figure that we've quoted in our testimony.

Basically, in a nutshell, what it says is that—and this is borne out in our conversations with the fire safety people as well—that hotels with sprinklers and smoke systems that would comply with the requirements in this bill tend to be in the higher range of the hotels that do business in any given area. The hotels that do not meet these compliance rules are in the lower range of the areas. Should you tell Federal employees that you must stay in one of these hotels that meets this requirement, then the range of usage will move to the upper range of hotels.

Now, at the same time, we know that that sounds like a lot of money, but it takes not very much to make a percentage point change when you're spending money at the rate the Government spends it on hotel reimbursement.

Mr. **Walgren**. Would the gentleman yield for one second?

Mr. **Walker**. Yes, I yield to the chairman.

Mr. Walgren. The assumption there, I gather, is that there would be no retrofitting of medium-range and lower-range hotels, that you would simply anticipate the Federal employee gravitating to the hotels that presently have sprinkler systems, which tend to be, I'm sure, the higher price range.

Mr. McDade. That's Runzheimer's answer to us.

Mr. Walgren. So the question to us is—

Mr. McDade. If the hotels retrofit, then you are going to get a smaller group excluded, and you would have to reimburse these employees for the proper amount. Now there are going to be some cases where it's going to be over the maximum allowed.

Mrs. Morella. Is there a—will both gentlemen yield?

Mr. Walgren. You have the time.

Mr. Walker. Just let me reclaim it, and then I'll yield back.

But isn't it true that we already have employees who are already staying in some of those high range hotels anyhow? I understand that that was not included in the study, that you already have a significant usage of those hotels by Federal employees anyhow, that to attribute the whole thing—

Mr. McDade. We would bunch them into the higher range, is what we are really saying. If you have a fairly even and predictable spread across the three ranges of hotels—low, medium, and high—if you tell the employees that, "We're going to only reimburse you if you stay in these hotels that are so equipped," then the gravitation is going to be from the lower-priced hotels, which tend to not be as well equipped, into the higher-priced hotels, which are well equipped.

Mr. Walker. According to the study, how many employees now stay in the high-range hotels?

Mr. McDade. I don't know. I believe it's pretty well equally distributed right now. Runzheimer feels that there would be a significant gravitation, and that's based on their experience.

Mr. Walker. So your testimony is that it's a one-third/one-third/one-third at the present time.

Mr. McDade. Right, basically. Right.

Mr. Walker. And that we would end up with more like a two-thirds/one-third situation.

Mr. McDade. That's essentially it.

The other thing is that the geographic disparities are tremendous here. I mean there are some areas where you have a lot of the hotels in all the ranges well equipped, and there are some areas where you have hotels that aren't equipped very well in all the ranges.

You mentioned Marriott. Government employees use Marriott a great deal. They use, by and large, a lot of chains, but, you know, employees don't just travel to New York City and to more sophisticated areas. There are a lot of mine inspectors and agricultural type inspectors, meat inspectors, and people like that, who use these things.

Mr. Walker. But isn't it true that of the 25 most traveled cities in the country by Federal employees, most of those are also the 25 best cities in terms of having sprinkler systems available?

Mr. McDade. I'm not sure of that, but that's probably, you know, to that tendency.

Mr. **Walker**. Thank you, Mr. Chairman.

Mr. **Walgren**. Thank you, Mr. Walker.

I want to apologize, but I have to excuse myself for some period of time, and I'd like to ask the gentleman from New York to take the chair and invite all his colleagues to address him as "Mr. Chairman."

[Laughter.]

Mr. **Boehlert** [presiding]. I'd like the record to note that this is not a palace coup, but it's probably the only committee on either the House or Senate at this time in history that is being chaired by a Republican. It feels pretty good. Let me just practice with the gavel.

Mr. Walker.

Mr. **Walker**. Consider this a warm-up, Mr. Chairman.

Mr. **Boehlert**. Thank you very much.

Mr. McDade, you know, using the logic that you have articulated here today, then GSA made a serious mistake back when it led the way in requiring that seat-belts be installed in automobiles. It was punitive in terms of the employees that we forced to buckle up; it was inequitable in terms of those families that we helped save the lives of their loved ones. Quite frankly, I don't envy you your task today, coming up here and giving us this testimony. I know you're doing your job, and you're doing it well, and I appreciate it, and at least we're glad to have from you support in principle. But I might add that we will probably weigh the testimony of GSA, as we did last time, very heavily in our minds, and we will consider the opposition, and then we will probably got the Floor and do what we did last time, pass this bill unanimously.

Thank you very much.

Mrs. Morella has one further.

Mrs. **Morella**. Just a brief question, Mr. McDade.

Thank you, Mr. Chairman.

Is there a maximum for the amount that can be spent for a hotel by the Federal employee?

Mr. **McDade**. Yes, there is.

Mrs. **Morella**. You mentioned a maximum.

Mr. **McDade**. Yes.

Mrs. **Morella**. And you list—you don't list hotels that are over the maximum, do you, or you just say there's a maximum amount?

Mr. **McDade**. We don't list hotels that are over the maximum when you include the meals and miscellaneous charges together and come up with a total amount of per diem for a given city or location.

If a hotel, for instance, is in an area where we would allow, say, $112 a day for both lodging and the meals and that hotel's lowest price that they would quote to us in a rate agreement was $113, no, we would not. But if it was more than the lodgings cap, we would probably list it if we want.

Mrs. **Morella**. You told us before that you get a certain amount for food; if you spend less, you have the rest yourself.

Mr. **McDade**. Right.

Mrs. **Morella**. You could use for a taxi or something.

But you said that there is—whatever they spend for the hotel is appropriate. I understand that you're not going to let them go luxury suites or you are going to have some kind of a cap. It just seems to me that your medium quality—if you want to call it that, for lack of a better term—hotels that would have the sprinklers would certainly fall within that category. So I don't know how you can say you're going to pull people from the real cheapies to a higher group—

Mr. McDADE. No, we're not saying that.

Mrs. MORELLA. —if there is, in fact, no cap, as such, placed on it, except for the luxury ones.

Mr. McDADE. It isn't quite that extreme. What we're really saying—and you have to understand, it doesn't take much of a migration in this to add up to a lot of money. What we're saying is that maybe the hotel that's currently—somebody using at $58 a night, or $48, or $38, will not have the particular equipment in it, but the hotel next-door that's at $39, $49, or $59, will have it, and if enough people spend a dollar more, for which the Government will reimburse them, the price overall to the Government will go up.

The migration is really probably so small that in individual circumstances you would never notice it. It would be—only in its total cumulative effect would it be a noticeable impact.

Mrs. MORELLA. Okay. You are saying when they go to a place, they're going to try to find the cheapest hotel.

Mr. McDADE. Cheap won't enter into it any more. You would have to enter—you would have to complicate it by saying the cheapest well equipped hotel.

Mrs. MORELLA. But right now you say they go to the least expensive.

Mr. McDADE. We leave that to them. The savings occur to the Government, but we let the employee pick within the range, and if he wants to stay at one that's more expensive, so be it, he doesn't get—he gets reimbursed just at the max.

Mrs. MORELLA. Right. So I just don't see how that would affect what you say will cost the Government more money, but thank you.

Thank you, Mr. Chairman.

Mr. BOEHLERT. I think if we did anything more, it would be guilty of overkill, and since this hearing is about safety, we don't want to do that.

Thank you very much, Mr. McDade and Mr. Wall.

The next panel consists of Mr. A. Elwood Willey, Assistant Vice President, Research and Fire Information Services, for the National Fire Protection Association; Chief David Hilton, Second Vice President, International Association of Fire Chiefs; Frederick H. Nesbitt, Legislative and Political Representative, International Association of Fire Fighters; and Martin H. Reiss, Chairman of the Board, the Gamewell Corporation, representing the National Electrical Manufacturers Association; and we will proceed, gentlemen, in the order in which the panel was announced. Mr. Willey, you will have the privilege of being first.

I also would like to say that, gentlemen, your statements will appear in their entirety in the record. If you wish to summarize, that would be welcomed in the interests of time. Mr. Willey, you are first.

STATEMENTS OF A. ELWOOD WILLEY, ASSISTANT VICE PRESIDENT, RESEARCH AND FIRE INFORMATION SERVICES, NATIONAL FIRE PROTECTION ASSOCIATION, QUINCY, MASSACHUSETTS; FREDERICK H. NESBITT, LEGISLATIVE AND POLITICAL REPRESENTATIVE, INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS, WASHINGTON, D.C.; DAVID HILTON, SECOND VICE PRESIDENT, INTERNATIONAL ASSOCIATION OF FIRE CHIEFS, WASHINGTON, D.C.; AND MARTIN H. REISS, CHAIRMAN OF THE BOARD, THE GAMEWELL CORPORATION, REPRESENTING THE NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION, MEDWAY, MASSACHUSETTS

Mr. Willey. Good afternoon. I am Elwood Willey, Assistant Vice President for Research and Fire Information Services at the National Fire Protection Association.

NFPA would like to thank you, Mr. Chairman, and your committee, for the opportunity to present testimony today on H.R. 94. NFPA supports the efforts of this committee and its staff in pursuing legislation to increase fire safety measures in hotels.

For the past 18 years, I have been responsible for fire investigations and fire analysis programs at NFPA. These programs have had a major role in monitoring the U.S. fire problem and helping to shape solutions to reduce loss of life and property due to fire.

During my career as a fire protection engineer, a deputy fire marshal, a fire officer, I have had direct experience with hotel fire safety. I've seen fires, and I've also seen improvements. Over the decades, NFPA has provided leadership in addressing the U.S. fire problem, including hotel fire safety, through its data and investigations, its education programs, and its fire safety codes and standards, such as the Life Safety Code.

When the subject of H.R. 94 surfaced in 1988, NFPA recommended that the committee consider adopting The Life Safety Code. This national consensus code contains a systems approach to fire protection in hotel occupancies which we believe would be most appropriate for the legislation.

As you know, there was a rash of tragic fatal hotel fires in the early 1980's—17 months, 132 lives were lost in just 4 fires, all in modern hotels. These included the MGM Grand, the Stouffer's Inn, the Las Vegas Hilton, and the West Chase Hilton.

The NFPA, along with the U.S. Fire Administration and the Center for Fire Research, launched major studies of these fires, and full reports were made available to the entire fire community and the public for educational purposes.

Beyond analyses of these fires, we initiated a number of programs with other organizations, which included the hotel industry, to improve hotel fire safety. During this period, fast response sprinkler technology and smoke detection technologies were further developed; codes and standards were revised to include this improved technology. Given these recent developments, there remains a hotel fire safety challenge ahead, as this committee has recognized.

I would like to submit for the record a technical paper by Dr. John Hall, NFPA's Director of Fire Analysis and Research.

Mr. Boehlert. Without objection, it is so ordered.

Mr. Willey. Thank you.

Dr. Hall's paper should assist the committee in its deliberations on H.R. 94.

[Dr. Hall's technical paper follows:]

Report Prepared for the House Subcommittee on Science, Research, and Technology on H.R. 94, The Hotel and Motel Fire Safety Act of 1989

by John R. Hall, Jr., Ph.D.
Director, Fire Analysis and Research
National Fire Protection Association

March 2, 1989

This paper addresses the subject of hotel and motel firesafety. The author is Director of Fire Analysis and Research for the National Fire Protection Association (NFPA). NFPA testified last year on the same bill, and as those statements remain the position of NFPA, the purpose here is not to repeat or to refine that testimony.

The purpose is rather to set out in greater detail the size, patterns, history, trends, and characteristics of U.S. fire experience in hotels and motels. This base of facts will then be used to suggest conclusions that will bear upon the likely impact of the current bill and the larger question of what is needed for hotel and motel firesafety.

First, the hotel and motel fire problem needs to be put in context. In 1987, the latest year for which we have fire statistics, there were 5,810 people killed in U.S. fires, not counting those in the fire service. Four out of five of those deaths occurred in American homes, a pattern that has held in every recent year. Many people are aware that fire deaths occur primarily in homes. Not so many are aware that the next largest share of fire deaths occurs in cars, trucks, and other vehicles - 755 such deaths in 1987, or one out of every eight fire deaths. Only 5% of all fire deaths - or 310 in 1987 - occur in public buildings. Clearly, then, the first priority for real impact on America's fire death toll has been and continues to be those places where Americans paradoxically feel safest - their homes and their cars.

At the same time, NFPA realizes as you do that public buildings are held to a higher standard than private homes and cars. When people place themselves in the hands of strangers, they expect to be protected. Therefore, it is important to note that hotel and motels represent the largest single share of public building fire deaths, accounting for 50 fire deaths in 1987 or one-sixth of the total of 310 public-building fire deaths.

Hotels and motels have made great strides in lowering their fire losses in the past decade. If figures for 1986 and 1987 are compared to figures for 1978 and 1979, which are the earliest years we have, then hotel and motel fires have declined 32%, associated civilian fire deaths have declined 63%, and associated civilian fire injuries have declined 66%. (See Table 1 and Figures 1-2.) These are remarkable accomplishments, even more because they include significant reductions after 1982, when the home fire death problem hit a plateau and stopped declining.

The leading causes of fire deaths and injuries in hotels and motels are carelessness with smoking materials and arson. (See Tables 2-3.) Together, they cause roughly 70% of all fire deaths and 60% of all fire injuries in these properties. Smoking-related fire deaths typically occur in a guest room and typically affect only the occupants of that room. In fact, 52.3% of hotel and motel fire deaths and 41.4% of injuries are suffered by persons in the room where the fire began. These are not the kinds of fire deaths that dominate the headlines or the public debate, but they are the largest part of the problem, nevertheless.

There still remains the concern over the very large hotel or motel fire. It is easy to understand the sources of public concern. Only one U.S. hotel fire in this century has been deadlier than the Dupont Plaza Hotel fire in 1986 and the MGM Grand Hotel fire in 1980. (See Table 4.) Each of these fires by itself caused more loss of life than nearly two years of hotel and motel fires at the current rate. During a 17-month period from November 1980 to May 1982, we lost 132 lives in just four fires, all in modern hotels. So it is appropriate to focus attention on the deadliest hotel and motel fires and identify their distinctive patterns.

For this paper, NFPA has prepared a summary table on design and operating characteristics relevant to fire severity for each of the 23 hotel and motel fires of the past two decades that killed 10 or more people. (See Tables 5-8.) We have used a broad definition that should include all the relevant fires anyone might be interested in. This includes home hotels, large boarding homes, fires confined to separate conference center facilities, and the Dupont Plaza Hotel fire in Puerto Rico, even though it did not occur in the 50 states or the District of Columbia. These 23 fires caused a total of 532 deaths, or more than 26 deaths a year.

A close look at these 23 incidents reveals two fairly distinct types of facilities. Most of these fires occurred in old buildings that were not high-rise and that catered to the lower end of the lodging market, that is, the poor and disadvantaged. The majority of these facilities were constructed before any of the existing model building codes were first published. The firesafety deficiencies in these buildings were glaring even to an untrained eye. These deficiencies typically began with open stairways, setting the stage for rapid spread of fire and smoke beyond the first involved floor and early loss of the use of all exit passages out of guest rooms. Detection and suppression systems were either totally or nearly non-existent. More than one of these facilities was operating in violation of some local code, despite the considerable advantages older buildings have in grandfather clauses that keep codes from being applied retroactively.

Here we see the lodging industry's analogue of the larger patterns of our American fire problem. The poor, the elderly, the disadvantaged, all suffer the ravages of fire out of proportion to their numbers. When Americans think of hotels and motels, they do not think of these places. When Federal workers book lodging for official travel, they do not stay at these places. But they are there, nevertheless, and they are a key to further progress in hotel and motel firesafety.

What remains from this list of 23 are six fires -- the Dupont Plaza Hotel fire, the MGM Grand Hotel fire, the Stouffer's Inn conference center fire, the Westchase Hilton fire and two Holiday Inn fires. Add to these the Las Vegas Hilton fire and perhaps a couple of hotel fires in neighboring Canada, and you have the fires that have defined for most people the nature and character of the American hotel and motel fire problem. As we have seen, the impression is incorrect, but let us take these incidents on their own terms.

A close look shows that these six facilities collectively show the same patterns of multiple deficiencies across the board. The deficiencies may have been less severe than those in the older hotels and motels, but they were there nevertheless. Open stairways in the two Holiday Inns, inadequate protection of vertical concealed spaces in the MGM Grand, unprotected vertical openings between floors in the Dupont Plaza, and a deficient self-closing door assembly in the Westchase Hilton, all assured that fire and smoke would be able to spread too rapidly from an initial ignition. Interior finish often added to the potential for rapid fire growth or flame spread in critical areas. Detection and alarm systems typically lacked key system design features or had key sections non-operational. Staff lacked the training to deal with emergencies, and in the Westchase Hilton fire, actively prevented the alarm system from warning guests. Exiting arrangements were a problem in these incidents, including insufficient numbers and sizes of exits, marking of exits, insufficient separation of the two ways out so one fire could eliminate both exit paths, and insufficient protection of the exit paths from remote fires. And finally, none of these facilities had complete sprinkler systems that could have stopped the spread of fire initially and thus might have compensated, at least in part, for the other design and operating deficiencies.

Whether we focus on all the deadliest hotel and motel fires of recent decades or only those involving more modern hotels, then, we find the same general lessons. Fire protection depends upon an integrated system of features and systems, each one designed to work with and, if necessary, compensate for the failure of others. Such systems are technically complex and need to be thought out as a whole. NFPA's Life Safety Code is essential to this process because it alone of the various model codes can address the problems of existing buildings, and as we have seen, most serious hotel and motel fires involve old buildings.

Automatic sprinkler protection can be a very powerful tool in such a system. NFPA has no record of a fire killing three or more people in any public assembly, institutional, educational, or residential property that had a complete sprinkler system, properly installed and operational, except for cases of explosion or flash fire. This impressive performance is recognized in the NFPA Life Safety Code. The use of a complete automatic sprinkler system permits the reduction of many other provisions but not their abandonment. (See Table 9.) With or without sprinklers, fire protection must work as a system. Our experience with serious hotel and motel fires shows that effective fire protection must be capable of dealing with even an accelerant-fed arson fire in an exit corridor or stairwell because those kinds of challenges have occurred. And, unfortunately, they probably will occur again. The Stouffer's Inn and Westchase Hilton fires illustrate particularly well that even a single design flaw -- such as carpeting that blocks a self-closing door or an exit path layout that does not provide a remote second exit from a meeting room -- can have disastrous consequences.

Against this standard of appropriate minimum fire protection, the lodging industry has made great progress in the past decade, not only in reducing overall fire loss but also in expanding coverage of features such as detection and sprinkler systems. We can most easily measure the use of detectors and sprinklers in hotels and motels that had fires. Hotel and motel fires reported as having detectors present rose from 29.6% in 1980 to 63.8% in 1986. Those reported as having sprinklers present rose from 11.5% in 1980 to 22.9% in 1986. (See Figure 3.) And because these are statistics for hotels and motels having fires, we know that the overall percentage of hotels and motels having detectors and sprinklers is much higher. For example, in 1986, 77% of homes had smoke detectors but only 38% of home fires were in homes with detectors. Addressing hotels and motels more directly, a 1988 survey conducted by the American Hotel and Motel Association found that 48.6% of hotels and motels had guest rooms sprinklered and 42.4% had corridors sprinklered. Two-thirds of those over six stories had both guest rooms and corridors sprinklered. While the three model building codes and the NFPA Life Safety Code all now require sprinklers for some new hotels, depending on height, the magnitude of progress by the lodging industry clearly far exceeds the breadth of impact that could have been expected from the direct effect of these codes alone.

It is worthwhile to pause here and review the key findings to this point. Hotel and motel fires and fire losses have declined substantially in the past decade and represent less than 1% of fire deaths each year, but they remain the largest component of the public building fire deaths that most concern the public. Hotel and motel fire deaths may be divided into three components. The largest component has consisted of victims killed by fires that began in the same room with them, most frequently because of careless handling of smoking materials. The second component has consisted of victims killed in multiple-death fires in older, poorer lodging facilities that typically catered to the low end of the lodging market and had a myriad of very serious fire protection deficiencies. The smallest component has consisted of victims killed in multiple-death fires in fairly modern facilities that catered to the middle and upper ends of the lodging market and that typically had a number of serious fire protection deficiencies, though generally fewer and less severe deficiencies than those in the second group.

In the face of this situation, the lodging industry has made enormous gains in this decade. The growth in state and local codes requiring detector systems has been a factor. The model code requirements for sprinklers in some new hotels have been a factor. The intense public attention to the major hotel and motel fires of the past decade has been a factor. The growing number of individuals and organizations who make fire protection a condition for booking hotels and motels has been a factor. But in fairness, the lodging industry has gone far beyond what they have been required to do or pressured to do, and they show every sign of continuing to improve conditions.

The question that remains is what can best be done to move on from here. A bit of NFPA history may help illustrate a point. In 1927, the year that the oldest of the three existing model building codes published its first edition, NFPA published the first edition of the Building Exits Code. In 1946, 199 people died in just three hotel fires, the worst such year on record, and state and local government interest in the Building Exits Code grew overnight. However, many jurisdictions found the code could not be easily adopted into law because of format incompatibilities, so NFPA began revising the code for greater adoptability, an exercise that first manifested itself in the 1956 edition of the Building Exits Code. That exercise continued and reached full fruition when the 1966 edition was expanded and renamed as the Life Safety Code. Now the Life Safety Code was ready for adoption, and today it is widely but far from universally adopted. Only one of the 23 deadliest hotel and motel fires of 1969-1988 was in a facility covered by law by the Life Safety Code, and that facility did not conform on many counts.

The point of all this history is to emphasize the organizational difficulties that must be addressed in any proposal to change firesafety in hotels and motels. No national organization or Federal agency is immune from some facet of these difficulties. Because they address only the construction or renovation stage, building codes exclude existing buildings where most of the risk is focused. Both building codes and the NFPA Life Safety Code are effective only to the degree that the 50 states and tens of thousands of local jurisdictions are individually persuaded to adopt them. State and local codes typically do not have jurisdiction over Federal buildings, such as the office where Speaker Wright had a fire a few years ago. And of course, no matter who adopts a code, serious enforcement occurs at a local level. Local jurisdictions are further hampered by restricted resources that make it difficult for them to inspect and enforce codes to the degree they should. Also, the national organizations of the lodging industry are hampered because fire risk occurs disproportionately in fringe facilities that are outside the reach of their influence. And many individually owned and operated facilities do not participate in the lodging industry's national organizations.

Even when problems seem to have technological solutions, real success always comes down to this kind of organizational question. When atriums became popular in the 1970s, NFPA made sure the firesafety implications of this challenging new architecture were addressed in standards. But such solutions only work if state and local jurisdictions adopt them and enforce them. When fast-response sprinkler technology for residential properties appeared and offered the promise of greater effectiveness and lower cost, NFPA helped sponsor research to demonstrate its potential and refine its design, analysis to document its performance, and standards revisions to show how and when it should be applied. But all this work succeeds only if the lodging industry and state and local jurisdictions act on what we find.

With this as background, what are the Federal government's alternatives to improve hotel and motel firesafety in general and to encourage the appropriate use of sprinklers in particular? An official preference for use of lodging facilities that have sprinklers and smoke detection systems by Federal government staff on official travel, especially at conferences, would have great value as an act of leadership. To be effective this policy should be mandatory.

There is also the danger of putting so much emphasis on this one strategy that its potential is overestimated. As we've already noted, fire risk is greatest in the poverty end of the hotel and motel industry which Federal workers already do not use. More resources may be needed to help state and local jurisdictions act directly to improve firesafety in all lodging facilities. Older, poorer lodging facilities tend to be in older, poorer communities, so those hotels and motels that should concern us most will tend to be found most often in those communities that need the most help in controlling firesafety in hotels and motels. Also, we must keep in mind the momentum that the lodging industry already has achieved in upgrading fire protection in its facilities, particularly those frequented by business travelers. A Federal policy of traveling preferentially to well-protected facilities would reinforce the industry's own momentum.

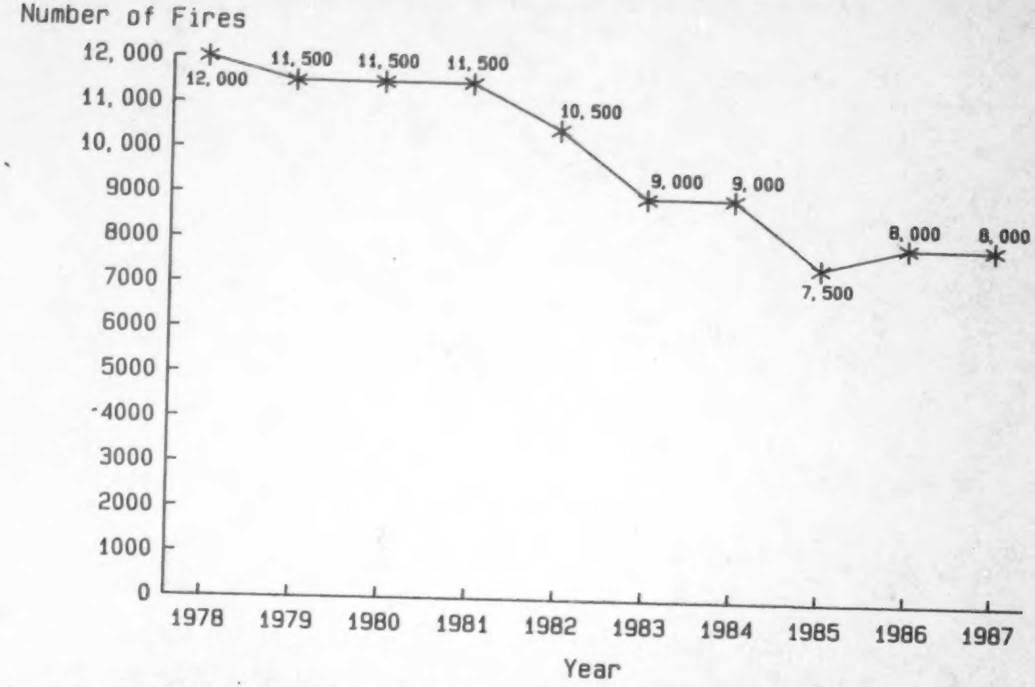
Table 1.

U.S. Hotel and Motel Fires, 1978-Present

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Damage
1978	12,000	130	600	$82M
1979	11,500	140	1,225	$100M
1980	11,500	165	1,075	$154M
1981	11,500	90	850	$99M
1982	10,500	75	450	$84M
1983	9,000	80	450	$64M
1984	9,000	120	300	$50M
1985	7,500	85	375	$56M
1986	8,000	50	325	$70M
1987	8,000	50	300	$80M

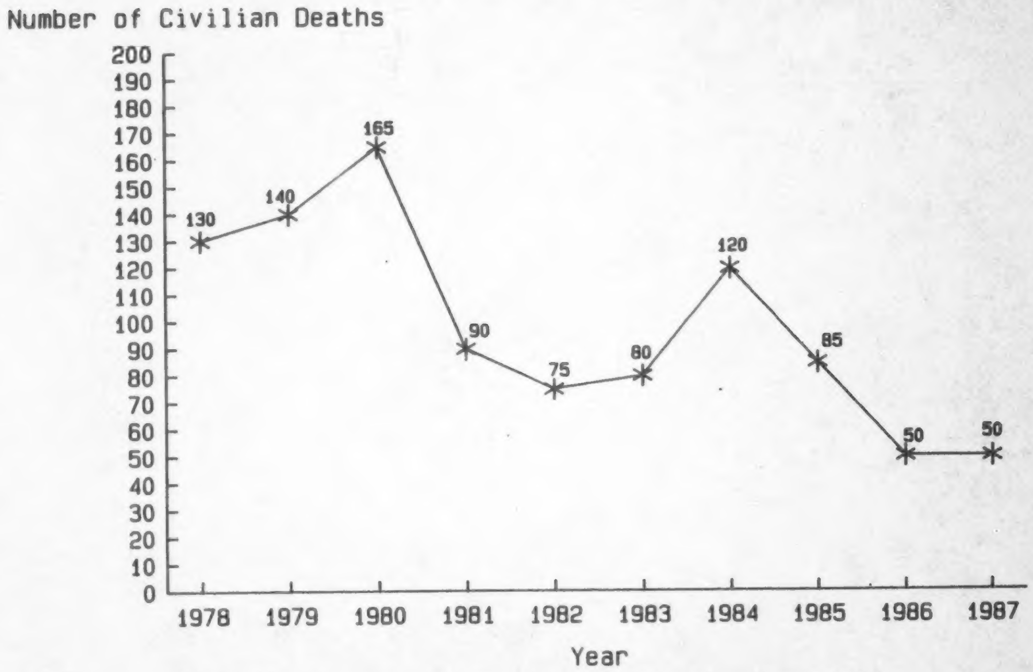
Source: 1978-87 NFPA surveys of U.S. fire departments. The hotel/motel category includes large boarding and rooming houses (over 15 lodgers) and residential (home) hotels.

Figure 1.
U.S. Hotel and Motel Fires, 1978-1987



Source: 1978-87 NFPA surveys of U.S. fire departments. The hotel/motel category includes large boarding and rooming houses (over 15 lodgers) and residential (home) hotels.

Figure 2.
U.S. Hotel and Motel Fire Deaths, 1978-1987



Source: 1978-87 NFPA surveys of U.S. fire departments. The hotel/motel category includes large boarding and rooming houses (over 15 lodgers) and residential (home) hotels.

Table 2.

Causes of Civilian Deaths and Injuries
Hotel and Motel Fires, 1982-86 Annual Average
Unknown-Cause Fires Allocated Proportionally

Cause	Civilian Deaths	Civilian Injuries
Smoking materials	21 (36.7%)	143 (30.0%)
Incendiary or suspicious causes	18 (32.6%)	138 (29.0%)
Cooking equipment	4 (6.4%)	43 (9.0%)
Stoves	2 (3.7%)	20 (4.3%)
Portable cooking, warming units	2 (2.8%)	14 (3.0%)
Heating equipment	4 (6.4%)	29 (6.0%)
Water heaters	2 (3.7%)	7 (1.4%)
Fixed area heaters	2 (2.8%)	14 (2.9%)
Open flame, embers, or torches	3 (5.5%)	14 (2.9%)
Matches	2 (2.8%)	4 (1.3%)
Electrical distribution	2 (3.7%)	39 (8.2%)
Cords, plugs	2 (3.7%)	12 (2.5%)
Child playing	2 (3.7%)	8 (1.7%)
Other equipment	1 (1.4%)	18 (3.9%)
Other heat	1 (1.4%)	7 (1.5%)
Natural causes	1 (1.4%)	4 (0.7%)
Appliances, tools, or air conditioning	1 (0.9%)	32 (6.7%)
Exposure (to other hostile fire)	0 (0.0%)	2 (0.9%)
Total	56 (100.0%)	475 (100.0%)

Source: 1982-86 NFIRS, NFPA Survey.

Civilian deaths and injuries are expressed to the nearest one. Percentages are calculated on the actual estimates, which include fractions of a casualty per year, so two figures with the same rounded-off estimates may have different percentages.

The 12 major cause categories are based on a hierarchy developed by the U.S. Fire Administration. Sums may not equal totals because of rounding errors.

Table 3.

Causes of Fires and Direct Property Damage
Hotel and Motel Fires, 1982-86 Annual Average
Unknown-Cause Fires Allocated Proportionally

Cause	Fires	Property Damage (in Millions)
Smoking materials	2,100 (24.0%)	$ 7.1 (10.4%)
Incendiary or suspicious causes	1,900 (20.9%)	$20.4 (29.8%)
Cooking equipment	1,100 (12.1%)	$ 5.8 (8.5%)
Stoves	600 (6.8%)	$1.8 (2.7%)
Portable cooking, warming units	200 (1.8%)	$0.5 (0.7%)
Ovens	100 (1.5%)	$2.6 (3.8%)
Heating equipment	900 (10.1%)	$ 7.2 (10.5%)
Fixed area heaters	300 (3.4%)	$2.0 (3.0%)
Chimneys	200 (1.7%)	$0.1 (0.2%)
Central heating units	100 (1.5%)	$0.9 (1.4%)
Water heaters	100 (1.4%)	$0.7 (1.1%)
Appliances, tools, or air conditioning	900 (9.5%)	$ 3.2 (4.6%)
Dryers	400 (4.4%)	$0.7 (1.1%)
Local air conditioning units	100 (1.0%)	$1.1 (1.6%)
Electrical distribution	700 (7.7%)	$ 8.9 (13.0%)
Fixed wiring	200 (2.2%)	$2.9 (4.3%)
Lighting fixtures, ballasts, signs	200 (1.7%)	$2.1 (3.0%)
Cords, plugs	100 (1.1%)	$0.6 (0.8%)
Open flame, ember, or torches	400 (5.0%)	$ 4.7 (6.9%)
Torches	200 (1.8%)	$3.8 (5.6%)
Matches	100 (1.2%)	$0.2 (0.2%)
Other equipment	400 (4.8%)	$ 3.6 (5.3%)
Other heat	200 (1.8%)	$ 1.3 (1.9%)
Exposure (to other hostile fire)	100 (1.4%)	$ 4.6 (6.8%)
Child playing	100 (1.4%)	$ 0.5 (0.8%)
Natural causes	100 (1.3%)	$ 1.1 (1.6%)
Total	9,000 (100.0%)	$68.4 (100.0%)

Source: 1982-86 NFIRS, NFPA Survey.
Fires are expressed to the nearest hundred, property damage to the nearest hundred thousand dollars. Property damage figures have not been adjusted for inflation. Percentages are calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.
The 12 major cause categories are based on a hierarchy developed by the U.S. Fire Administration. Sums may not equal totals because of rounding errors.

Table 4. Ten Deadliest U.S. Hotel and Motel Fires of the Twentieth Century

	Fire	Civilian Deaths
1.	Winecoff Hotel, Atlanta, Georgia December 7, 1946	119
2.	MGM Grand Hotel, Las Vegas, Nevada November 21, 1980	85
3.	LaSalle Hotel, Chicago, Illinois June 5, 1946	61
4.	Gulf Motel, Houston, Texas September 7, 1943	54
5.	Kerns Hotel, Lansing, Michigan December 11, 1934	35
6.	Terminal Hotel, Atlanta, Georgia May 16, 1938	32
7.	Barton Hotel, Chicago, Illinois February 12, 1955	29
8A.	Arcadia Hotel, Boston, Massachusetts December 2, 1913	28
8B.	Pioneer International Hotel, Tucson, Arizona December 20, 1970	28
10.	Stouffer's Inn (conference center), Harrison, New York December 4, 1980	26

Note: The Dupont Plaza Hotel fire, San Juan, Puerto Rico, December 31, 1986, is not included because it is not part of the 50 states and the District of Columbia. If included, it would rank second.

Table 5. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - General Characteristics

Fire	Civilian Deaths	Age of Building	Height of Building	Codes in Use
Dupont Plaza Hotel San Juan, Puerto Rico December 31, 1986	97	23-26 years old	20 stories	Puerto Rico's Building Regulation, dated August 13, 1954. The regulatory agency relies on self-certification of plans etc. by subcommittees; construction sites are usually not inspected by agency representatives.
MGM Grand Hotel Las Vegas, Nevada November 21, 1980	85	7 years old	23 stories	Uniform Building Code (1970 edition) Uniform Mechanical Code (1970 edition) Uniform Plumbing Code (1970 edition) National Electrical Code (1968 edition)
Pioneer International Hotel Tucson, Arizona December 20, 1970	28	41 years old	11 stories	Undetermined
Stouffer's Inn (conference center facility) Harrison, New York December 4, 1980	26	4 years old	3 stories	New York Building Code
Stratford Apartments (home hotel) Los Angeles, California November 15, 1973	25	45 years old	3-1/2 stories	Undetermined
Dorothy Mae Apartment Hotel (home hotel) Los Angeles, California September 4, 1982	24	54-55 years old	4 stories	Undetermined

Table 5. Characteristics of 1969-1988 U.S. Hotel and Motel Fires That Killed Ten or More People - General Characteristics (continued)

Fire	Civilian Deaths	Age of Building	Height of Building	Codes in Use
Ozark Hotel Seattle, Washington March 20, 1970	20	About 60 years old	5 stories	Undetermined
Pathfinder Hotel Fremont, Nebraska January 10, 1976	20	59 years old	6 stories	Undetermined
Coates House Hotel Kansas City, Missouri January 28, 1978	20	92 years old	6 stories	No applicable codes identified in view of age of building.
Ponet Square Hotel (home hotel) Los Angeles, California September 13, 1970	19	63 years old	4 stories	Undetermined
Royal Beach Hotel (home hotel) Chicago, Illinois March 14, 1981	19	75-80 years old	4 stories	Undetermined
Stratford Hotel Breckenridge, Minnesota January 28, 1977	17	67 years old	3 stories	Undetermined
Elliott Chambers Boarding House (large boarding home) Beverly, Massachusetts July 4, 1984	15	About 84 years old	3 stories	Undetermined

Table 5. Characteristics of 1969-1988 U.S. Hotel and Motel Fires That Killed Ten or More People - General Characteristics (continued)

Fire	Civilian Deaths	Age of Building	Height of Building	Codes in Use
Alexander Hamilton Hotel Paterson, New Jersey October 18, 1984	15	59 years old	8 stories	Undetermined
Pinters Hotel (home hotel) Hoboken, New Jersey April 30, 1982	13	Undetermined	4 stories	Undetermined
Pennsylvania House Hotel (home hotel) Tyrone, Pennsylvania January 16, 1972	12	About 75 years old	3 stories	Undetermined
Washington House Hotel Berkeley Springs, West Virginia August 25, 1974	12	About 94 years old	4 stories	Undetermined
Allen Motor Inn Honesdale, Pennsylvania November 5, 1978	12	120 years old	3 stories	Undetermined
Westchase Hilton Houston, Texas March 6, 1982	12	2 years old	13 stories	Houston Building Code

Table 5. Characteristics of 1969-1988 U.S. Hotel and Motel Fires That Killed Ten or More People - General Characteristics (continued)

Fire	Civilian Deaths	Age of Building	Height of Building	Codes In Use
Pomona Hotel (home hotel) Portland, Oregon July 7, 1975	11	50 years old	3 stories	Undetermined
Wenoah Park Apartment Hotel Bay City, Michigan December 10, 1977	10	96 years old	4 stories	Undetermined
Holiday Inn Greece, New York November 26, 1978	10	15 years old	2 stories	New York Building Construction Code (1958) New York Multiple Residence Law NFPA *National Fire Codes* (1973-74) NFPA *Life Safety Code* (1973)
Holiday Inn Cambridge, Ohio July 31, 1979	10	11 years old	2 stories	Ohio Building Code Ohio Fire Prevention Code

Table 6. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Construction, Compartmentation, and Interior Finish

Fire	Construction and Compartmentation	Vertical Spread Path Protection	Interior Finish
Dupont Plaza Hotel San Juan, Puerto Rico December 31, 1986	The room of origin (south ballroom) lacked adequate fire protection features to permit storage there. Such protection could have been provided by an automatic extinguishing system or by 1-hour fire-resistance-rating construction and self-closing or smoke-actuated fire doors. Actual construction included one wall that was a combustible, removable partition; glass window panels in a second wall; and no self-closing provisions for doors.	Under the NFPA Life Safety Code, the unprotected vertical opening between the ballroom level (where fire originated) and the casino level (where nearly all deaths occurred) would not have been allowed, given the lack of other fire protection design features of that area. Numerous vertical paths to the upper stories of the building were a means of smoke spread but only one of the 96 deaths was affected by these.	Under the NFPA Life Safety Code, interior finish in all ballrooms, including the room of origin, should have been Class A or Class B. The wall finish of the room of origin contributed to the rapid fire growth.

Table 6. Charactistics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Construction, Compartmentation, and Interior Finish (continued)

Fire	Adequacy of Construction and Compartmentation	Adequacy of Vertical Spread Path Protection	Interior Finish
MGM Grand Hotel Las Vegas, Nevada November 21, 1980	Contributing to the vertical smoke spread were unprotected seismic joint shafts and elevator hoistways; insufficient fire-resistance rating used in interior stairway construction; exposure of stairway and exit passageway spaces to casino level plenum air; and heating, venting, and air conditioning systems that had fire dampers that could not activate.	Smoke spread occurred via unprotected vertical openings (concealed spaces, elevator shafts) and insufficiently protected stairways.	Interior finish was combustible in the deli (area of origin) and in the casino (area of greatest growth) and contributed to fire growth but less so than did the greater fuel load of contents.

Table 6. Characteristics of 1969-1988 U.S. Hotel and Motel Fires That Killed Ten or More People - Construction, Compartmentation, and Interior Finish (continued)

Fire	Construction and Compartmentation	Vertical Spread Path Protection	Interior Finish
Pioneer International Hotel Tucson, Arizona December 20, 1970	From the fourth floor corridor where fire began, upper floors were reached by two stairways, the main stairway open to all upper floors and another stairway ending at the sixth floor and open to all floors it reached above the fourth. These stairways were the main paths for fire spread. Deaths occurred among occupants of the 6th through 11th floors. Two died when fire burned through wood surrounding a door installed in a space too large for it.	Interior stairways were open and unenclosed. They were the main paths of fire spread.	Corridors and stairs were carpeted (100% acrylic), with two layers of padding under carpet in corridors and carpeting extending 22 inches up the walls. Above the carpeted areas of the wall were sections of wood, wallpaper, and plastic-laminated plywood. Interior finish contributed to fire.

Table 6. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Construction, Compartmentation, and Interior Finish (continued)

Fire	Construction and Compartmentation	Vertical Spread Path Protection	Interior Finish
Stouffer's Inn (conference center facility) Harrison, New York December 4, 1980	No problems affecting spread of fire or smoke were noted where fatalities occurred.	Vertical fire and smoke spread was not a factor in this fire.	Interior finish (vinyl wall covering) may have been a problem in this fire.
Stratford Apartments (home hotel) Los Angeles, California November 15, 1973	Both interior exits from the lobby (where fire began) were via unenclosed stairways. Fire occurred before end of grace period for city ordinance requiring enclosure of stairways. Doors to individual units performed well.	All three interior stairways were unenclosed (with one not extending down to the lobby) and were the paths for rapid fire and smoke spread.	Lobby had wood paneling on wood nailers. Rest of building had painted wood lath and plaster. Investigator did not comment on contribution of interior finish.
Dorothy Mae Apartment Hotel (home hotel) Los Angeles, California September 4, 1982	Self-closing fire doors from north stairway to second, third, and fourth floor corridors were all disabled or blocked open, allowing fire originating in second floor corridor to spread throughout second and third floors. Doors to individual units performed well.	Self-closing fire doors from top three floors into north stairway were all disabled or blocked open. Absence of full fire-stopping in heating flue chase also was a factor in fire spread through concealed spaces.	Combustible (painted plywood) wall paneling in second-floor corridor was a major factor in flame spread.

Table 6. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Construction, Compartmentation, and Interior Finish (continued)

Fire	Construction and Compartmentation	Vertical Spread Path Protection	Interior Finish
Ozark Hotel Seattle, Washington March 20, 1970	The two stairways were open from ground floor to top floor and provided the main paths of fire spread for the two incendiary fires started in the two stairways.	The two open stairways spread fire quickly through the building.	Undetermined.
Pathfinder Hotel Fremont, Nebraska January 10, 1976	Stairways, elevator shafts, and pipe chases were insufficiently protected.	Inadequate. After initial gas explosion, which caused 14 of the 20 deaths, fire spread from basement to upper floors via insufficiently protected vertical pipe chases and elevator shafts. Fire, fed by gas, burned through wood partitions separating shafts from floors and killed six persons.	Unreported but not a factor in fire.

Table 6. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Construction, Compartmentation, or Interior Finish (continued)

Fire	Construction and Compartmentation	Vertical Spread Path Protection	Interior Finish
Coates House Hotel Kansas City, Missouri January 28, 1978	Wood doors with inadequate fire resistance, relative to the standards of the then-current edition of the NFPA Life Safety Code, and with some unprotected transoms were used for guest rooms and for storage rooms. Stairways and elevator shafts were unenclosed. Some fire doors were roll-type fire doors that did not operate during fire. The south section, with ordinary construction, suffered wall and floor collapses and accounted for most deaths.	Stairways were not enclosed and one open stairway provided the main avenue of fire spread.	Walls and ceilings were wallpapered. Corridor had wood panel wainscot. Corridors were carpeted. Investigators did not comment on their contribution to fire.

Table 6. Characteristics of 1969-1988 U.S. Hotel and Motel Fires That Killed Ten or More People - Construction, Compartmentation, and Interior Finish (continued)

Fire	Construction and Compartmentation	Vertical Spread Path Protection	Interior Finish
Ponet Square Hotel (home hotel) Los Angeles, California September 13, 1970	All interior stairways were open and 19 vertical vents extended from top to bottom.	Chimney effect of open vents and stairways produced rapid fire spread to upper floors from first-floor linen storage area origin.	Undetermined.
Royal Beach Hotel (home hotel) Chicago, Illinois March 14, 1981	Fire spread out of the first-floor laundry room when its non-fire-rated door failed early. Fire then spread down corridor rapidly because of exposed wooden joists of floor/ceiling assembly penetrating tile-block walls.	The doors to the two stairways were glass-paneled and not fire-rated, and the doors to the rear stairway failed. Fire spread rapidly up the rear stairway, fueled in part by the wooden stairs themselves.	Interior finish was not a factor.
Stratford Hotel Breckenridge, Minnesota January 28, 1977	Interior construction was mostly wood, including floors and stairways, and was believed to have contributed significantly to fire spread.	Stairways were open and constructed of wood; they helped significantly to spread fire.	Undetermined

Table 6. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Construction, Compartmentation, and Interior Finish (continued)

Fire	Construction and Compartmentation	Vertical Spread Path Protection	Interior Finish
Elliott Chambers Boarding House (large boarding home) Beverly, Massachusetts July 4, 1984	Stairways were unenclosed, contrary to a Fire Prevention Bureau inspection recommendation provided nearly six years earlier. This played a significant role in fire spread. Glass skylight failed and produced chimney effect, adding to spread of fire spread.	Stairways were unenclosed and played a significant role in fire spread.	Interior finish on walls, both in the alcove area of origin and in the open stairways, were combustible and a significant factor in fire spread.
Alexander Hamilton Hotel Paterson, New Jersey October 18, 1984	Bathroom ventilation shafts provided unprotected vertical connection between all floors and were a factor in smoke spread.	Doors to interior stairways were often blocked open by 55 gallon steel drums used for trash collection. This led to rapid smoke and fire penetration of all stairways.	Renovations introduced less fire-resistant door assemblies and combustible wall finish, which contributed to rapid fire growth.
Pinters Hotel (home hotel) Hoboken, New Jersey April 30, 1982	Stairways were unenclosed and provided rapid access for second-floor stairway fire to upper floors.	Open stairway was a major factor in fire spread.	Undetermined

Table 6. Characteristics of in 1969-1988 U.S. Hotel and Motel Fires That Killed Ten or More People - Construction, Compartmentation, or Interior Finish (continued)

Fire	Construction and Compartmentation	Vertical Spread Path Protection	Interior Finish
Pennsylvania House Hotel (home hotel) Tyrone, Pennsylvania January 16, 1972	Wood building with non-fire-stopped walls and only one stairway, unenclosed, which was the main avenue of fire spread.	Construction had no features to prevent vertical fire spread. Open stairway was primary avenue of spread.	First floor, where fire began, had some wood paneling. The significance of the interior finish was not characterized.
Washington House Hotel Berkeley Springs, West Virginia August 25, 1974	Lack of firestopping, including lack of stairway enclosure, led to fire spread up stairways, up elevator shaft, and through walls.	Lack of firestopping, including lack of stairway enclosure, was a major factor in fire development.	Undetermined.
Allen Motor Inn Honesdale, Pennsylvania November 5, 1978	All four stairways were unenclosed and had been cited, along with 15 other violations, in a 1977 state inspection report, which ordered shutdown of the top two floors until renovations were made. However, owner continued to operate under three time extensions until fire destroyed building.	All four stairways were unenclosed.	Some sections of corridors were wood paneled.

Table 6. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Construction, Compartmentation, or Interior Finish (continued)

Fire	Construction and Compartmentation	Vertical Spread Path Protection	Interior Finish
Westchase Hilton Houston, Texas March 6, 1982	The self-closing door to the guest room where fire originated did not fully close, possibly because carpeting was installed in a way that interfered with its operation. This gave smoke access to the corridor. Heavy smoke conditions in several rooms despite good compartmentation of rooms that allowed smoke in only through cracks around doors or when doors were opened to check corridor conditions.	Early vertical smoke spread probably occurred via the bathroom vent system or a pipe chase. Smoke also spread from the room of origin through the door to the corridor. Once in the corridor, smoke spread to other floors via the elevator shaft and to one stairway when an exit door was blocked open by a chair. It appears that malfunctions of the fire alarm system and power supply may have allowed the other pressurized stairway and the heating, venting, and air conditioning system to remain in non-emergency status, which added to smoke spread to upper floors. None of this spread resulted in fire fatalities.	Interior finish was not a factor in this fire.
Pomona Hotel (home hotel) Portland, Oregon July 7, 1975	Stairway was open on 1st and 3rd floors and was area of fire origin.	Stairway was open on 1st and 3rd floors.	Undetermined

Table 6. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Construction, Compartmentation, or Interior Finish (continued)

Fire	Construction and Compartmentation	Vertical Spread Path Protection	Interior Finish
Wenoah Park Apartment Hotel Bay City, Michigan December 10, 1977	Both stairways were open.	Both stairways were open.	Plywood paneling in some corridors helped feed the fire in early stages. So did carpeting to some degree.
Holiday Inn Greece, New York November 26, 1978	Stairways were either unenclosed, or enclosed using non-fire-rated doors, or enclosed using fire doors equipped with doorstops that encouraged them to be held open. Storage rooms with non-fire-rated doors were in one stairway. Fire began in stairway.	Stairways were not sufficiently enclosed, as noted to left.	Lightweight plywood paneling in stairway did not meet Life Safety Code, was involved early in fire, and produced rapid growth and spread.
Holiday Inn Cambridge, Ohio July 31, 1979	The three stairways were open to the corridors. Fire began in the first-floor corridor and fire and smoke spread rapidly throughout building.	The three stairways were open.	Carpeting and some wall covering in corridors had excessively high flame-spread properties.

Table 7. Characteristics of 1969-1988 U.S. Hotel and Motel Fires That Killed Ten or More People - Means of Egress and Staff Performance

Fire	Exiting Provisions	Exit Path Protection	Staff Training and Performance
Dupont Plaza Hotel San Juan, Puerto Rico December 31, 1986	The west-end casino door (opposite to the end from which the fire progressed) was of inadequate size relative to the requirements of the NFPA Life Safety Code, opened inward and required two simultaneous actions to open. Exiting arrangement was even more inadequate, giving the unprotected vertical opening from ballroom to casino.	The vertical opening between ballroom and casino caused fire and smoke to block exit pathways from the casino early in the fire, before many of the occupants of the casino were aware of the fire.	Staff apparently had not been trained to deal with fire emergencies. Reporting of the fire to the fire department occurred roughly 10 minutes after staff discovery of the fire.

Table 7. Characteristics of 1969-1988 U.S. Hotel and Motel Fires That Killed Ten or More People - Means of Egress and Staff Performance (continued)

Fire	Exiting Provisions	Exit Path Protection	Staff Training and Performance
MGM Grand Hotel Las Vegas, Nevada November 21, 1980	The number and capacities of exits from the casino were deficient and they produced excessively long travel distances, based on the NFPA Life Safety Code, although tne exiting capacity probably was adequate for the number of people present at the time of the fire.	Substandard enclosure of interior stairs, smokeproof towers, and exit passageways contributed to loss of life. The use of corridor air by the heating, venting, and air conditioning system and the system's continued operation during the fire spread smoke and gases into corridors and guest rooms of the tower floors. The termination of stairways at exit passageways that were in the casino plenum area added to smoke exposure. Elevators could not be controlled during fire to prevent their use and exposure of occupants. Guest room doors were not self-closing.	There was no evidence that staff had or followed a fire emergency plan. Reporting to the fire department was delayed and occupants of the high-rise tower were not notified of fire.

Table 7. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Means of Egress and Staff Performance (continued)

Fire	Exiting Provisions	Exit Path Protection	Staff Training and Performance
Pioneer International Hotel Tucson, Arizona December 20, 1970	Unenclosed stairways were quickly filled with smoke.	Unenclosed stairways were quickly filled with smoke, filling corridors and blocking access to fire escapes.	Undetermined.
Stouffer's Inn (conference center facility) Harrison, New York December 4, 1980	The two meeting rooms where fatal victims were located had exit paths that recombined at a remote location inside the facility which proved not to be sufficiently remote to avoid effects of the fire.	The accelerant-fed arson fire probably would have rendered the corridor untenable no matter what protection was provided, unless the exit paths had been constructed so as not to converge indoors.	When staff received the alarm, they silenced it while investigating the source of the alarm.
Stratford Apartments (home hotel) Los Angeles, California November 15, 1973	Alternatives to interior exits were inoperative in many instances. Doors to exterior metal fire escapes were nailed shut in some instances as a makeshift security arrangement, and first-floor windows were blocked by iron grillwork.	Unenclosed stairways provided avenues for rapid fire and smoke spread, which also blocked all main routes out.	There is no reference to on-site staff.
Dorothy Mae Apartment Hotel (home hotel) Los Angeles, California September 4, 1982	Investigators identified no inherent inadequacies in building's exiting provisions.	Self-closing fire doors from top three floors into north stairway were all disabled or blocked open.	Despite presence of assistant manager, there was considerable delay between fire discovery and the first report to the fire department.

Table 7. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Means of Egress and Staff Performance (continued)

Fire	Exiting Provisions	Exit Path Protection	Staff Training and Performance
Ozark Hotel Seattle, Washington March 20, 1970	The only stairways were open and were quickly filled with smoke and fire.	The only stairways were open and were quickly filled with smoke and fire.	Absence of a night clerk contributed to delayed detection and reporting.
Pathfinder Hotel Fremont, Nebraska January 10, 1976	Not reported. Since explosion destroyed first floor, all survivors were rescued from roofs and windows, and directed out fire escapes by the fire department.	Not reported and not a factor.	Staff had been attempting to reach gas company on-call personnel for two hours when explosion occurred, four hours after gas was first detected. No staff errors were noted.
Coates House Hotel Kansas City, Missouri January 28, 1978	Guest rooms did not have access to two exits; the only second exits were unprotected metal fire escapes or substandard. stairs. There was no emergency lighting and there were no illuminated exit signs, as NFPA Life Safety Code would require.	Stairways were not adequately protected.	Staff apparently were not sufficiently trained, particularly in view of the special needs of a tenant group with a large share of elderly persons.
Ponet Square Hotel (home hotel) Los Angeles, California September 13, 1970	All stairways were open and quickly filled with smoke and fire. Access to fire escapes was cut off by smoke-filled corridors and one fire escape was engulfed in flames from hotel lobby.	All stairways were open and quickly filled with smoke and fire.	No night clerk.

Table 7. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Means of Egress and Staff Performance (continued)

Fire	Exiting Provisions	Exit Path Protection	Staff Training and Performance
Royal Beach Hotel (home hotel) Chicago, Illinois March 14, 1981	Stairways had combustible construction. Stairway discharge area was not sufficiently separated from the rest of the first floor. Unusually large proportion of very young, elderly, and impaired or handicapped occupants may have complicated exiting.	Stairways were isolated from corridors by non-fire-rated doors; those leading to one stairway failed and spread fire. Rapid spread trapped many occupants.	Undetermined.
Stratford Hotel Breckenridge, Minnesota January 28, 1977	Stairways were open. Only one occupant survived, and he was rescued from his window by the fire department.	Stairways were open.	Undetermined.
Elliott Chambers Boarding House (large boarding home) Beverly, Massachusetts July 4, 1984	Stairways were unenclosed, and stairways and corridors became untenable rapidly. Emergency lighting was provided. Second-floor door to fire escape was secured by hard-to-operate eye-and-hook catch.	Stairways were unenclosed. Also glass light transoms would not have been acceptable under NFPA's Life Safety Code and permitted fire spread into some guest rooms.	*Undetermined.*

Table 7. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Means of Egress and Staff Performance (continued)

Fire	Exiting Provisions	Exit Path Protection	Staff Training and Performance
Alexander Hamilton Hotel Paterson, New Jersey October 18, 1984	Stairways were enclosed and sufficient.	Doors to stairways were blocked open, and the exit paths were rendered unuseable early in fire.	Night manager's investigation of smoke in guest rooms where fire began provided the developing fire with access to corridor.
Pinters Hotel (home hotel) Hoboken, New Jersey April 30, 1982	Openness of stairways caused stairways and corridors to become untenable rapidly.	Open stairways meant exit paths quickly became untenable.	Undetermined.
Pennsylvania House Hotel (home hotel) Tyrone, Pennsylvania January 16, 1972	There was only one interior stairway, unenclosed, and exterior fire escapes, unenclosed and constructed of wood. Stairways and corridors reportedly were quite narrow.	Lack of stairway enclosure meant that stairway and corridors were rendered untenable early in fire.	Owner had reportedly avoided cost of electrical repairs a few weeks before by installing oversized fuses, which led to fire ignition.
Washington House Hotel Berkeley Springs, West Virginia August 25, 1974	Stairways were unenclosed.	Stairways were unenclosed.	There was no night clerk on duty. Hotel operator was sleeping.
Allen Motor Inn Honesdale, Pennsylvania November 5, 1978	Stairways were unenclosed.	Stairways were unenclosed.	Undetermined.

Table 7. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Means of Egress and Staff Performance (continued)

Fire	Exiting Provisions	Exit Path Protection	Staff Training and Performance
Westchase Hilton Houston, Texas March 6, 1982	Provisions were adequate.	Carpeting interfered with door self-closer in room of origin, which caused corridor, part of exit path, to become heavily charged by smoke. Of the 30 occupants of the floor, only five escaped unaided through corridor, and these included the three occupants of the room of fire origin.	Staff repeatedly cut short automatic alarms, preventing timely notification of guests, and waited 15 minutes after first notification of smoke by a guest before calling fire department. This delay, spent investigating and searching for cause of smoke, permitted fire to reach full involvement in room of origin.
Pomona Hotel (home hotel) Portland, Oregon July 7, 1975	Two stairways were not fully enclosed.	Two stairways were not fully enclosed	Undetermined.
Wenoah Park Apartment Hotel Bay City, Michigan December 10, 1977	Both stairways were open.	Both stairways were open.	Lack of fire drills and lack of training in use of extinguishers and standpipes were cited as factors in fire severity.

Table 7. Characteristic of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Means of Egress and Staff Performance (continued)

Fire	Exiting Provisions	Exit Path Protection	Staff Training and Performance
Holiday Inn Greece, New York November 26, 1978	Stairways were not protected according to the NFPA Life Safety Code, which was law in that jurisdiction. Stairways had interior finish that did not meet fire spread requirements. A closet had been built in one of the stairways. Travel distances to exits exceeded limits set by the NFPA Life Safety Code. Doors from guest rooms to corridors were not self-closing.	Stairways were not properly protected and had high-flame-spread interior finish.	Staff did not notify fire department when they learned of fire, 8 minutes before a passerby fire fighter called it in. Alerting of guests was inadequate.
Holiday Inn Cambridge, Ohio July 31, 1979	All stairways were open. Stairways and corridors had high flame-spread wall covering and carpeting. One stairway had a closet built into it.	Stairways were open and interior finish spread fire rapidly along exit paths.	Undetermined.

Table 8. Characteristics of 1969-1988 U.S. Hotel and Motel Fires That Killed Ten or More People - Detection and Suppression Systems

Fire	Detection Systems	Suppression Systems
Dupont Plaza Hotel San Juan, Puerto Rico December 31, 1986	There was no automatic detection system except for a local fire alarm systems in the hotel portion of the high-rise tower (manual pull stations in guest rooms, alarm sounding devices near stairway entrances). This system was reportedly not working at the time of the fire.	Automatic sprinkler protection consisted of partial protection in the laundry and storage areas, including laundry and trash chutes. An automatic sprinkler system could have been part of an alternative design, acceptable under the NFPA Life Safety Code, to compensate for the vertical opening between the bathroom and casino. A computer analysis indicated that automatic sprinklers would have presented flashover in the room of origin and thereby eliminated the possibility of a multiple-death fire.
MGM Grand Hotel Las Vegas, Nevada November 21, 1980	Fire alarm system lacked manual pull stations in the deli and casino areas that would have been required for these natural escape paths under NFPA's Life Safety Code. Fire alarm system was not activated or did not operate to alert occupants of the high-rise tower. Heating, venting, and air conditioning systems continued to operate, distributing smoke and other products of combustion to the high-rise tower.	Automatic sprinklers were provided in portions of the casino and arcade levels and operated effectively in those areas. The pattern of sprinkler protection was considered in accordance with the Uniform Building Code. Since it was a windowless area, the deli where fire began would have been required to have sprinkler protection by the NFPA Life Safety Code.
Pioneer International Hotel Tucson, Arizona December 20, 1970	No automatic detection or fire alarm equipment.	No automatic sprinklers. Standpipe systems were present.

Table 8. Characteristics of 1969-1988 U.S. Hotel and Motel Fires That Killed Ten or More People - Detection and Suppression Systems (continued)

Fire	Detection Systems	Suppression Systems
Stouffer's Inn (conference center facility) Harrison, New York December 4, 1980	The fire alarm system was not sounded early in the fire. Because of the fire's growth rate, fueled by accelerants, and its location, however, even earlier notification might not have provided occupants enough time to use the corridors for safe exiting.	No automatic sprinklers.
Stratford Apartments (home hotel) Los Angeles, California November 15, 1973	No automatic detection or fire alarm equipment.	No automatic sprinklers.
Dorothy Mae Apartment Hotel (home hotel) Los Angeles, California September 4, 1982	Individual units had single-station smoke detectors, some inoperative due to missing batteries. Absence of automatic detection in corridors and absence of fire alarm system were factors in delayed discovery of fire, which increased the number of persons trapped by fire.	No automatic sprinklers. Standpipe systems were present.
Ozark Hotel Seattle, Washington March 20, 1970	No automatic detection system.	No automatic sprinklers.

Table 8. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Detection and Suppression Systems (continued)

Fire	Detection Systems	Suppression Systems
Pathfinder Hotel Fremont, Nebraska January 10, 1976	No automatic detection system.	No automatic sprinklers.
Coates House Hotel Kansas City, Missouri January 28, 1978	No automatic detection system. Fire alarm system had unknown coverage and could apparently be activated only at hotel clerk's desk.	No automatic sprinklers. A standpipe hose system was provided.
Ponet Square Hotel (home hotel) Los Angeles, California September 13, 1970	No automatic detection system.	No automatic sprinklers.
Royal Beach Hotel (home hotel) Chicago, Illinois March 14, 1981	Fire alarm system was activated but did not sound alarm. Smoke detectors were limited to individual units, and one-fourth of those checked after fire had missing batteries. Detectors in public areas were limited to rate-of-rise heat detectors in main corridor.	No automatic sprinklers.
Stratford Hotel Breckenridge, Minnesota January 28, 1977	No automatic detection system. Fire alarm could be activated only at front desk and was not activated.	No automatic sprinklers.

Table 8. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Detection and Suppression Systems (continued)

Fire	Detection Systems	Suppression Systems
Elliott Chambers Boarding House (large boarding home) Beverly, Massachusetts July 4, 1984	Smoke detection system in corridors activated and alerted occupants but not before fire had entered stairways and barely before smoke made exit access corridors untenable. Guest rooms had heat detectors. Fire department was notified by passing policeman at least 13 minutes after alarm sounded in building.	No automatic sprinklers.
Alexander Hamilton Hotel Paterson, New Jersey October 18, 1984	Smoke detectors in rooms operated in most cases, but the performance of the fire alarm system could not be determined.	No automatic sprinklers. A standpipe system and a hose rack were present.
Pinters Hotel (home hotel) Hoboken, New Jersey April 30, 1982	No automatic detection system. Owner had been fined for this the day before the fire.	No automatic sprinklers.
Pennsylvania House Hotel (home hotel) Tyrone, Pennsylvania January 16, 1972	No automatic detection system.	No automatic sprinklers.
Washington House Hotel Berkeley Springs, West Virginia August 25, 1974	No automatic detection system. No fire alarm system installed.	No automatic sprinklers.

Table 8. Characteristics of 1969-1988 U.S. Hotel and Motel Fires That Killed Ten or More People - Detection and Suppression Systems (continued)

Fire	Detection Systems	Suppression Systems
Allen Motor Inn Honesdale, Pennsylvania November 5, 1978	No automatic detection system. No fire alarm system.	No automatic sprinklers.
Westchase Hilton Houston, Texas March 6, 1982	Room smoke detectors sounded alarm only in room. The corridor smoke detector nearest the room of origin may have been inoperative. This smoke detector, located at the elevator lobby area, may have malfunctioned. Room detectors in rooms other than room of origin may not all have operated because the smoke entry through door cracks may have meant smoke was aged enough to reduce detector response ("cold smoke" phenomenon) and smoke may have been drawn away from detector by room air flow pattern. Possible alarm system malfunction and mismatched detection device in heating, venting, and air conditioning tower return air duct may have prevented system from activating emergency protection of HVAC system and pressurized stairways.	Sprinkler protection was provided only for linen chutes. Standpipe systems and hose racks were present.

Table 8. Characteristics of 1969-1988 U.S. Hotel and Motel Fires
That Killed Ten or More People - Detection and Suppression Systems (continued)

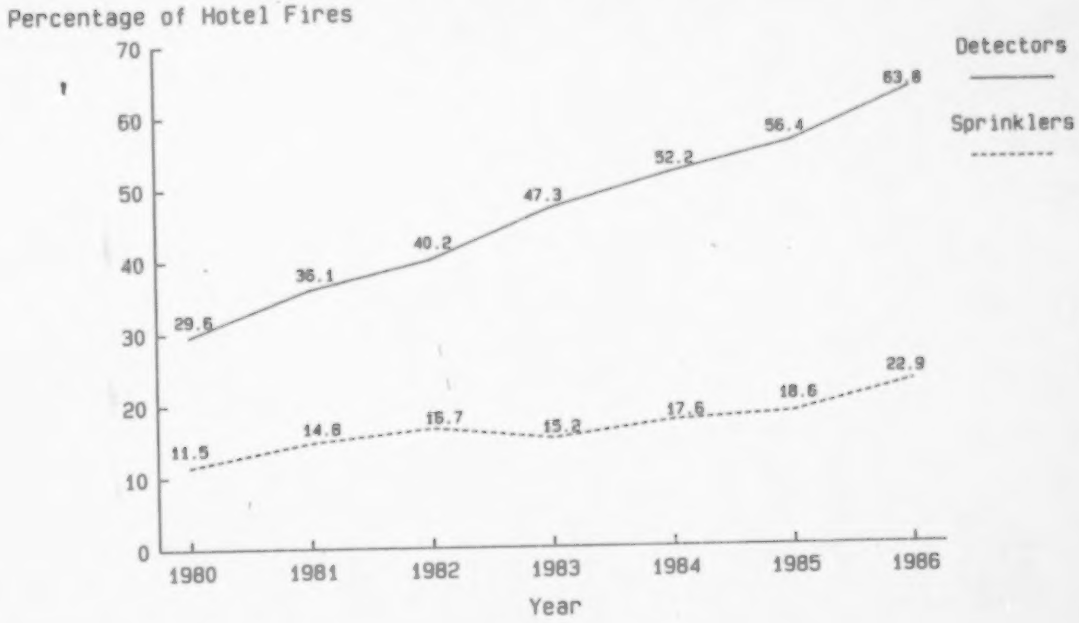
Fire	Detection Systems	Suppression Systems
Pomona Hotel (home hotel) Portland, Oregon July 7, 1975	No automatic detection system.	No automatic sprinklers. Fire extinguisher was used but ineffective against large incendiary fire using accelerant.
Wenoah Park Apartment Hotel Bay City, Michigan December 10, 1977	No automatic detection system. No fire alarm system.	No automatic sprinklers. Standpipes were present.
Holiday Inn Greece, New York November 26, 1978	Fire alarm system had manual pull stations in corridors, heat detectors in corridors and some mechanical spaces, and was not connected to fire department as required by the NFPA Life Safety Code. Fire department found manual pull station at registration desk did not work. Alarm bell wiring also failed.	No automatic sprinklers.
Holiday Inn Cambridge, Ohio July 31, 1979	No automatic detection system. Fire alarm system had manual pull stations, was not connected to the fire department, was not clearly audible and recognizeable in many rooms, and was not activated until untenable conditions already existed in corridors.	No automatic sprinklers.

Table 9. Examples of Relaxed Provisions of NFPA Life Safety Code for New Hotels With Complete Automatic Sprinkler Protection

- Exit enclosures and vertical-opening enclosures normally required to be of two-hour fire-rated construction can be reduced to one-hour fire-rated construction.
- Interior corridor walls normally required to be of one-hour fire-rated construction can be reduced to one-half-hour fire-rated construction.
- Hazardous areas normally required to be of one-hour fire-rated construction can be enclosed in non-fire-rated construction.
- Interior wall and ceiling finish requirements can be reduced from Class A to Class B or from Class B to Class C.
- Interior floor finish normally required to have a Class I or Class II rating is not required to have a critical radiant flux rating.
- A corridor smoke detection system is not required.
- Maximum travel distances can be increased - common paths of travel and dead-end corridors from 35 to 50 feet, distance from within a room to corridor door from 75 to 125 feet, general distances from 100 to 200 feet.
- Smoke barriers are not required, and fire barriers between the hotel and mercantile establishments in the structure are not required.
- A presignal system in conjunction with the building fire alarm system is permitted with the approval of the authority having jurisdiction.
- Operable windows for escape or ventilation are not required.

Note: A similar but different list exists for existing buildings.

Figure 3.
Fires in Hotels and Motels
With Detectors or Sprinklers Present



Source: NFPA analysis of NFPA and NFIRS data.

Mr. **Willey**. A few highlights from the paper may help to put the hotel fire problem in perspective with the overall U.S. fire problem.

In 1987, there were 5,810 civilians who died in U.S. fires; 4 out of 5 of these deaths occurred in American homes, which I'm sure most of you know. Only 5 percent of all fire deaths, or about 310 people, were killed in fires in public buildings.

Hotels represent the largest single share of public building fire deaths, or about 50 per year over the last two or three years.

NFPA statistics also show great strides in lowering hotel fire losses in the past decade. Hotel fires have declined 32 percent, and fire deaths have declined some 63 percent. These are remarkable accomplishments.

Yet there still remains the concern over the large hotel fire, the one that creates the headlines that capture the public's attention. Based on NFPA investigations of major fires, we analyzed 23 hotel fires over the past two decades that killed 10 or more. These 23 incidents reveal two types of facilities and associated fire death problems.

Most of the fires and the majority of the deaths were in older, inner city type hotels that had numerous and serious fire protection deficiencies. Now these hotels generally cater to the poor and the elderly.

There were, secondly, six fires, or 240 deaths, that were in modern hotels that also had serious fire protection deficiencies, like the MGM Grand, for example. These tend to be in the middle or upper ends of the market, and these are probably the ones that would be within the reach of H.R. 94.

There are overriding practical lessons gained from this review of the fatal hotel fires. First and foremost, these tragic major fires need not have happened if the principles of good fire safety design had been observed. Fire protection depends upon an integrated system of design and operating features.

Today, we have available state-of-the-art smoke detection and alarm systems and fast response sprinklers to ensure life safety. We have current national codes, such as the Life Safety Code and Model Building Codes, to address the identified deficiencies.

The Life Safety Code is the only national model code which addresses the problem of existing hotels. Codes must be adopted and enforced by State and local governments as a front line against hotel fires.

In the face of this situation, the lodging industry has made significant gains in fire safety in this decade. The lodging industry has gone beyond what they are required to do and shows every sign of continuing to improve conditions.

What are the Federal Government's alternatives to improve hotel fire safety and to encourage the application of sprinklers and detection and alarm systems?

Certainly, we need an official travel policy that provides for reimbursement of Federal employees' travel when they are lodged at hotels that have sprinklers and smoke detection systems. We urge the committee to persist in making this requirement mandatory.

We urge the subcommittee to give careful consideration to the adoption of existing national consensus fire safety codes and standards in the development and implementation of H.R. 94. Make no mistake, NFPA supports the subcommittee's work and the concept of the legislation. NFPA wishes to have legislation enacted which would make hotels more fire safe.

Finally, we would like to briefly discuss two technical aspects of H.R. 94. As mentioned, the Life Safety Code takes a systems approach and serves to coordinate the proper application of other standards. In the absence of the use of the Life Safety Code in the bill, we transmitted the NFPA position on the use of complete fire alarm and smoke detection systems in the hotels. The present legislation, as drafted, does not include the definition which we recommended. We urge adoption of the recommendation definition made by NFPA and others.

Secondly, we wish to compliment the subcommittee on its return to H.R. 94, to the earlier and stronger requirement that Federal employees not be reimbursed for hotels which do not comply with the policy. However, we urge that the legislation not exempt Federal Government buildings, such as dormitories, from the bill's requirements.

In conclusion, NFPA applauds the important work of the subcommittee and would like to work with the subcommittee in the spirit of openness and cooperation to resolve key issues of concern to the public and to move forward with the enactment of legislation to strengthen fire safety in our hotels.

With goodwill and cooperation of the Chairman and ranking minority member, we had the opportunity during the last session to fully explore several issues of key importance. We will continue to work with the subcommittee and others and resolve to work together on the most important objective, which is fire safety.

That concludes my remarks, and we'll entertain questions.

[The prepared statement of Mr. Willey follows:]

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TESTIMONY OF A. ELWOOD WILLEY

ON BEHALF OF

THE NATIONAL FIRE PROTECTION ASSOCIATION

BEFORE THE

SUBCOMMITTEE ON SCIENCE, RESEARCH AND TECHNOLOGY

HOUSE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

HEARING OF THE SUBCOMMITTEE
ON H.R. 94
"THE HOTEL AND MOTEL FIRE SAFETY ACT OF 1989"

THURSDAY, MARCH 2, 1989

Good afternoon. I am Elwood Willey, Assistant Vice President of Research and Fire Information Services at the National Fire Protection Association. NFPA would like to thank you, Mr. Chairman, and your Committee for the opportunity to present testimony today on H.R. 94, "The Hotel and Motel Fire Safety Act of 1989". NFPA supports the efforts of this Committee and its staff in pursuing legislation to increase firesafety measures in hotels.

For the past 18 years, I have been responsible for fire investigations and fire analysis programs at NFPA. NFPA programs have had a major role in monitoring the U.S. fire problem and helping to shape solutions to reduce loss of life and property due to fire.

During my career as a fire protection engineer, a deputy fire marshal and a company fire officer, I have had direct experience with hotel and motel firesafety. I have conducted inspections, reviewed construction plans for building and fire code compliance, investigated fires and yes - fought fires in hotels and residential occupancies and searched for victims in those fires. Over the past 30 years, I have not only witnessed the problems, but must also say I have seen advancements in technology such as smoke detection systems and fast response sprinklers, and an increased level of firesafety applied in today's modern hotels and motels.

Over the decades, NFPA has been at the forefront of attacking the U.S. fire problem and the hotel fire concern through its data and investigations, its education programs and its firesafety codes and standards, such as the Life Safety Code. When the subject of a federal hotel/motel firesafety bill surfaced in 1988, NFPA urged the Subcommittee to consider adopting the ANSI/NFPA 101, Life Safety Code. This national consensus document contains a systems approach to fire protection in hotel and motel occupancies which we believe would be most appropriate for the legislation.

As you are aware, there was a rash of tragic fatal hotel fires in the early 1980s. In 17 months, 132 lives were lost in just 4 fires, all in modern hotels. These included the MGM Grand, the Stouffer's Inn, the Las Vegas Hilton and the Westchase Hilton. The NFPA, along with the U.S. Fire Administration and the Center for Fire Research, launched major studies of these fires and conducted human behavior studies to understand factors in fire growth, fire and smoke spread and why people either survived or died. Full reports were published and made available to the entire fire community and the public for educational purposes.

Beyond the analyses of these fires, NFPA initiated several programs with other organizations, including the hotel industry, to improve hotel firesafety. These included alert bulletins, workshops, seminars, forums, educational films and manuals. The objective was to reach those who could directly impact hotel firesafety - hotel operators and convention and meeting planners, in addition to hotel guests. During this period, much research and development of new technology, including fast response sprinkler technology and improved smoke detection systems occurred. Codes and standards were revised to include this improving technology.

Given these recent developments, there remains a hotel firesafety challenge ahead as this Committee has recognized. To help put the U.S. hotel and motel fire problem in perspective, I submit for the record a technical paper on hotel fires and firesafety by Dr. John Hall, Director of NFPA's Fire Analysis and Research Division. I believe Dr. Hall's paper will assist the Committee in its deliberations on H.R. 94.

A few highlights from Dr. Hall's paper will help put the hotel and motel fire problem in context with the overall U.S. fire problem. In 1987, there were 5,810 civilians killed in U.S. fires. Four out of five of these deaths occurred in American homes. Surprisingly, the next largest share of fire deaths occurred in cars, trucks and other vehicles. Only 5% of all fire deaths, or 310 in 1987, occurred in public buildings.

We realize, however, that buildings such as hotels are held to a higher standard by the public. That is why it is particularly distressing that hotels and motels represent the largest single share of public building fire deaths, accounting for 50 fire deaths in 1987, or one-sixth of the 310 public building fire deaths.

On the other hand, NFPA statistics also show great strides in lowering hotel and motel fire losses in the past decade. Overall, hotel and motel fires have declined 32%, civilian fire deaths have declined 63%, and civilian fire injuries in these fires have declined 66%. These are remarkable accomplishments.

Yet, there still remains the concern over the large hotel or motel fire - the one that creates headlines that capture the public's attention. It is easy to understand the source of public concern, and it is important to focus attention on the deadliest fires and examine their patterns.

Based on NFPA investigations and studies of major fires, we analyzed 23 hotel and motel fires of the past two decades that killed 10 or more. In all, there were 532 deaths, or more than 26 deaths a year. This includes residential hotels, large boarding homes, modern hotels, hotel conference centers, and the Dupont Plaza Hotel fire in Puerto Rico (even though it was outside the United States).

These 23 incidents reveal two fairly distinct types of facilities. Most of these fires occurred in older buildings that catered to the lower end of the lodging market, i.e., the poor and the disadvantaged. The majority of these facilities were constructed before the existing model codes were published. The firesafety deficiencies in these buildings were glaring even to the untrained eye. These deficiencies typically began with open stairways, setting the stage for rapid fire and smoke spread and early loss of safe access to exits. Fire detection and suppression systems were non-existent in these buildings. These facilities would not have met provisions of NFPA or model codes, if the codes had been applied.

When Americans think of hotels and motels, they do not think of old inner-city hotels which cater to the poor and the elderly. But they are there, nevertheless, with built-in, serious hazards. They remain a key to further progress in hotel and motel firesafety.

What remains from this list of 23 fires are several fires that occurred in more modern hotels -- the Dupont Plaza Hotel fire, the MGM Grand Hotel fire, the Stouffer's Inn conference center fire, the Westchase Hilton fire and two Holiday Inn fires. These are the fires that have defined for most people the U.S. hotel fire problem. This impression is not entirely correct.

A close look shows that these six facilities also show patterns of multiple deficiencies across the board. The deficiencies may have been less severe than those in the older hotels, but they were there nevertheless. Open stairways in the two low-rise Holiday Inns, inadequate protection of vertical concealed spaces in the MGM Grand, unprotected vertical openings between floors in the Dupont Plaza, and a deficient self-closing door assembly in the Westchase Hilton, all assured that fire and smoke would spread too rapidly. Interior finish or combustible contents often added to the potential for rapid fire growth or flame spread in critical areas. Detection and alarm systems typically lacked important system design features.

None of these facilities had complete automatic sprinkler systems that could have controlled the fires. Staff lacked the training or procedures to deal with emergencies, and in the Westchase Hilton fire, the staff actively prevented the alarm system from warning guests. Exit arrangements were deficient in these fires including: the number and sizes of exits, insufficient separation, exit marking, and protection of exit paths.

Even though hotel and motel fires and fire losses substantially declined over the past decade, they remain the largest component of public building fire deaths. The potential for a major fatal hotel fire exists if there is not adequate attention to firesafety.

It is important to note that hotel and motel fire deaths may be divided into three components:

1. those victims killed by fires that began in the same room with them, most frequently because of careless handling of smoking materials;
2. those victims killed in multiple-death fires in older, poorer lodging facilities that typically cater to the low end of the lodging market and have a myriad of very serious fire protection deficiencies;
3. those victims killed in multiple-death fires in fairly modern facilities that cater to the middle and upper ends of the lodging market and have a number of serious fire protection deficiencies, but fewer and less severe than those in the second group.

There are overriding practical lessons gained from this review of common patterns in the major, fatal hotel fires:

- First and foremost, these tragic major fires need not have happened, if the principles of good firesafe design had been observed;

- Fire protection depends upon an integrated system of design and operating features, i.e., the systems approach to firesafety;
- Today, we have available state-of-the-art smoke detection and alarm systems and fast response sprinklers to ensure life safety;
- We have current national codes such as the Life Safety Code and model building codes to address the identified deficiencies;
- The Life Safety Code is the only national model code which addresses the problem of existing hotels;
- Codes must be adopted and enforced by state and local governments as a front line against hotel fires.

In the face of this situation, the lodging industry has made significant gains in firesafety in this decade. The growth in model code requirements for sprinklers and for smoke detection and alarm systems in new hotels has been a factor. The intense public attention to the major hotel and motel fires of the past decade has been a factor. The growing number of individuals and organizations who make fire protection a condition for booking hotels and motels has been a factor. The lodging industry has gone beyond what they are required to do and shows every sign of continuing to improve conditions.

With this in mind, what are the federal government's alternatives to improve hotel and motel firesafety in general and to encourage the application of sprinkler, detection and fire alarm systems in particular?

Certainly, we need an official travel policy that provides for reimbursement of federal employee's travel solely when they lodge at hotels and motels that have sprinklers and smoke detection systems. We urge the Committee to persist in making this requirement mandatory, and not allow its provisions to be weakened.

Undoubtedly, the Subcommittee is aware of NFPA's role as one of the largest standards-setting organizations in the U.S. NFPA, through its volunteers, has sought to improve the environment from the dangers of fire. The use of voluntary standards by federal, state and local governments is a major part of the American safety system. We urge the Subcommittee to give careful consideration to the adoption of existing national consensus firesafety codes and standards in the development and implementation of H.R. 94.

It is NFPA's position that the federal government should not be required or permitted to duplicate the private sector's standards-making efforts -- whether it be the Federal Emergency Management Agency or some other agency within FEMA. The proposed legislation, in our view, would authorize FEMA to duplicate the work being performed by voluntary standards organizations and would provide the federal government with regulatory authority which has been reserved for state and local governments.

In our opinion, this legislation is inconsistent with the Federal Fire Prevention and Control Act of 1974. Further, OMB Circular A-119 establishes U.S. government policy which clearly calls for federal government use of voluntary standards. We disagree with the provisions of this bill to the extent that they do not fully utilize voluntary standards in combination with state and federal officials to deal with this issue. NFPA questions whether the legislation in its present form is appropriate in that it interferes with states' rights. NFPA policy is in conflict with this limited aspect of the legislation and these provisions establish unwise national policy in our view.

Make no mistake, NFPA supports the Subcommittee's work and the concept of the legislation. NFPA wishes to have legislation enacted which will make hotels and motels throughout the U.S. more safe against the dangers of fire.

Finally, we would like to briefly discuss two technical aspects of H.R. 94. As mentioned earlier, the Life Safety Code takes a total systems approach and serves to coordinate the proper application of other ANSI/NFPA fire protection standards, such as the Automatic Sprinkler and Fire Alarm Signaling Systems Standards. In the absence of the use of the Life Safety Code in the bill and in response to a request for information from the Committee in August 1988, we transmitted the NFPA position on the use of complete fire alarm and smoke detection systems in hotels and motels. The present legislation as drafted does not include the definition which we recommended. We would urge the Committee to review that aspect of the legislation and to adopt the recommendations made by NFPA and others. Other witnesses who will testify this afternoon have similarly urged the Subcommittee to take such action and NFPA supports the testimony of those witnesses.

Secondly, we wish to compliment the Subcommittee on its return in H.R. 94 to the earlier and stronger requirement that federal employees not be reimbursed for travel in hotels and motels which do not comply with the policy. However, we urge that the legislation not exempt federal government buildings, such as the dormitories of the National Fire Academy, FBI Academy and others, from the bill's requirements.

No one is more keenly aware, than those at NFPA of the possibility of misunderstanding during the legislative process. With good will and the cooperation and courtesy of the Chairman and the Ranking Minority Member, we at NFPA had the opportunity during the closing days of the last legislative session to fully explore with the Subcommittee and its staff certain issues which are of key importance to the public and to NFPA.

In conclusion, NFPA applauds the important work of the Subcommittee and would like to work with the Subcommittee in the spirit of openness, cooperation and compromise to resolve key issues of concern to the public and NFPA and to move forward with the enactment of legislation to strengthen the safety in our nation's hotels and motels against the threat of fire.

We are prepared to work the the Chairman, the Ranking Minority Member of the Subcommittee, and the others to see if we can join hands and resolve to work together for the most important objective -- firesafety.

Mrs. MORELLA [presiding]. Thanks, Mr. Willey. We are going to have questions for you, as you could anticipate.

Mr. WILLEY. Okay.

Mrs. MORELLA. Thank you very much for your very complete testimony.

I didn't even ask the photographer to come in, but when he saw me here in the chair I think he couldn't resist the opportunity, and I appreciate that very much.

[Laughter.]

Mr. Nesbitt, we're going to call on you, and it's good to see you again as Legislative and Political Representative of the International Association of Fire Fighters.

Mr. NESBITT. Good afternoon, Madam Chair.

Mrs. MORELLA. Thank you.

Mr. NESBITT. I assume the title was passed to you by Mr. Boehlert.

Mrs. MORELLA. Absolutely. Thank you for recognizing that.

Mr. NESBITT. Thank you.

My name is Fred Nesbitt, the Legislative and Political Representative of the International Association of Fire Fighters, AFL-CIO. the IAFF represents some 177,000 professional fire fighters across the United States and Canada.

At the outset, I want to thank the subcommittee Chairman, Mr. Walgren and the other sponsors of H.R. 94, Representatives Boehlert and Walker, for introducing this bill and providing our organization with an opportunity to testify today in support of the Hotel/Motel Fire Safety Act of 1989.

For at least 40 years, the fire service community has known that sprinklers and smoke detection devices are critical weapons in the battle against fire fatalities. Over the past 40 years, the technology for these devices has improved, making their installation affordable and efficient.

However, despite this progress, many public facilities have not installed these devices. The cost for this oversight, whether intentional or unintentional, is far too many fatalities, such as the tragic deaths of 97 people in the Dupont Plaza Hotel in San Juan, Puerto Rico, in 1986.

The IAFF strongly urges Congress to avoid any further delay in enacting this important safety measure. I'm sure the subcommittee recalls that the impetus for this bill was the 1987 subcommittee hearings on the Dupont Plaza Hotel fire and an analysis by the National Bureau of Standards that the fatalities might have been prevented if the hotel had had a sprinkler system in place.

In 1974, the distinguished National Commission on Fire Prevention and Control appointed by former President Richard Nixon, issued its dramatic report titled "America Burning." This report analyzed in detail the fire experience and record of the United States, including comparisons with other industrialized nations. The report was an indictment of the United States' appalling fire loss record.

The Commission stated—and I quote—"Appallingly, the richest and most technologically advanced nation in the world leads all major industrialized countries in per capita deaths and property loss from fire...The efforts of individuals and organizations in the fire protection field have run against the twin tides of ignorance and indifference—tides which contribute substantially to the extraordinary magnitude of the fire problem in the United States."

During the intervening 15 years since the release of this report, there has been some progress toward reducing deaths and property loss. However, the U.S. record remains unacceptably poor. It is worth noting that 36 percent of multiple fatality deaths—incidents occur in hotel fires.

Mr. Chairman, you and I both know what happens when the fire alarm rings in a hotel. Unfortunately, many travelers ignore it and do not exit the building. They assume it is a false alarm or look out the door for smoke and flames. Not enough travelers pay attention to fire exit locations or escape routes. Thus, there is a greater danger in a hotel fire because of this attitude than in a family dwelling or another dwelling. Perhaps those in greatest danger are the most frequent travelers. Sprinkler systems and smoke detectors will help save lives of hotel/motel guests across the country.

For these reasons, the Federal Government must take a renewed and comprehensive look at the tragic consequences of uncontrolled fire. Enactment of H.R. 94 represents an important step toward reducing fire fatalities and injuries in multi-storey buildings. The bill appropriately requires the USFA to develop guidelines for sprinkler and smoke detection installation. The USFA is the Federal agency with the technical expertise and jurisdiction over fire-related issues.

Finally, I want to address the cost issue. The opponents of this legislation have raised the cost of installation as a prohibitive factor, although many hotels have installed these systems and continue to operate profitably. Installation of sprinklers and smoke detectors is not an unduly burdensome requirement. Most importantly, the IAFF is unwilling to put a price on the lives of fire fighters who have been killed in the line of duty, and we believe that Congress should not do so either.

In closing, I want to state that enactment of this measure provides only one line of defense, among many, to the Nation's fire problem. In addition, legislation is needed creating stronger building codes and stricter fire safety and toxicity standards for finishing materials and furnishings. There is much room for improvement in our fire record, and I urge the subcommittee to move expeditiously to mark up and favorably report this important piece of safety legislation.

Mr. Chairman, that concludes my testimony. I'd be happy to answer any questions.

[The prepared statement of the International Association of Firefighters follows:]

INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS

ALFRED K. WHITEHEAD
President

VINCENT J. BOLLON
Secretary-Treasurer

TESTIMONY

BEFORE THE

HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
SUBCOMMITTEE ON SCIENCE, RESEARCH AND TECHNOLOGY

ON

THE HOTEL/MOTEL FIRE SAFETY ACT OF 1989

MARCH 2, 1989

BY

ALFRED K. WHITEHEAD
PRESIDENT

1750 NEW YORK AVENUE, N.W., WASHINGTON, D.C. 20006-5395 • (202) 737-8484 • FAX (202) 737-8418

Good afternoon. My name is Alfred K. Whitehead and I am the President of the International Association of Fire Fighters, AFL-CIO. The IAFF represents 177,000 professional fire fighters across the United States and Canada.

At the outset, I want to thank Subcommittee Chairman Walgren and the sponsors of H.R. 94, Representatives Boehlert and Walker for introducing this bill and providing our organization with an opportunity to testify today in support of the Hotel/ Motel Fire Safety Act of 1989.

For at least 40 years, the fire service community has known that sprinklers and smoke detection devices are critical weapons in the battle against fire fatalities. Over the past 40 years, the technology for these devices has improved, making their installation affordable and efficient. However, despite this progress, many public facilities have not installed these devices. The cost for this oversight--whether intentional or unintentional-- is far too many fatalities, such as the tragic deaths of 97 people in the Dupont Plaza Hotel in San Juan, Puerto Rico in 1986.

The IAFF strongly urges Congress to avoid any further delay in enacting this important safety measure. I'm sure the Subcommittee recalls that the impetus for this bill was the 1987 Subcommittee hearing on the Dupont Plaza Hotel Fire and an analysis by the National Bureau of Standards that the fatalities might have been prevented if the hotel had had a sprinkler system in place.

In 1974, the distinguished National Commission on Fire Prevention and Control, appointed by former President Richard Nixon, issued its dramatic report titled "America Burning." This report analyzed in detail the fire experience and record of the United States, including comparisons with other industrialized nations. The report was an indictment of the United States' appalling fire loss record. The Commission stated and I quote: "Appallingly, the richest and most technologically advanced nation in the world leads all the major industrialized countries in per capita deaths and property loss from fire...The efforts of individuals and organizations in the fire protection field have run against the twin tides of ignorance and indifference--tides which contribute substantially to the extraordinary magnitude of the fire problem in the United States."

During the intervening 15 years since the release of this report, there has been some progress toward reducing deaths and property loss, however, the U.S. record remains unacceptably poor. It is worth noting that 36% of multiple fatality incidents occur in hotel fires. Mr. Chairman, you and I both know what happens when the fire alarm rings in a hotel. Unfortunately, many travelers ignore it and do not exit the building. They assume it is a false alarm or look out the door for smoke or flames. Not enough travelers pay attention to fire exit locations or escape routes. Thus, there is a greater danger in a hotel fire because of this attitude than in a family home or other dwelling. Perhaps those in greatest danger are the most frequent travelers. Sprinkler systems and smoke detectors will help save lives of hotel/motel guests across America.

For these reasons, the federal government must take a renewed and comprehensive look at the tragic consequences of uncontrolled fire. Enactment of H.R. 94 represents an important step toward reducing fire fatalities and injuries in multi-story buildings. The bill appropriately requires the USFA to develop guidelines for sprinkler and smoke detector installation. The USFA is the federal agency with the technical expertise and jurisdiction over fire related issues.

Finally, I want to address the cost issue. The opponents of this legislation have raised the cost of installation as a prohibitive factor, although many hotels have installed these systems and continue to operate profitably. Installation of sprinklers and smoke detectors is not an unduly burdensome requirement. Most importantly, the IAFF is unwilling to put a price on the lives of fire fighters who have been killed in the line of duty, and we believe that Congress should not do so either.

In closing, I want to state that enactment of this measure provides only one line of defense, among many, to the nation's fire problem. In addition, legislation is needed creating stronger building codes and stricter fire safety and toxicity standards for finishing materials and furnishings. There is much room for improvement in our fire record, and I urge the Subcommittee to move expeditiously to mark-up and favorably report this important piece of safety legislation.

Mr. Chairman, that concludes my testimony and I would be happy to answer any questions.

Mr. **Boehlert** [presiding]. Thank you very much, Mr. Nesbitt. Chief Hilton.

Mr. **Hilton**. Good afternoon, Congressman Boehlert.

My name is David Hilton, and I am Fire Chief of Cobb County, Georgia. I'm also here representing the International Association of Fire Chiefs, an organization representing almost 10,000 fire officials in this country. I am the elected Second Vice President of this organization.

I'd like to preface my remarks by commenting to you, the Vice Chair now, Chairman Walgren, Congressman Walker, for introducing the H.R. 94, Hotel and Motel Safety Act of 1989. I would also like to express my appreciation for those other interested Congress persons being here—Mr. Ritter and Mrs. Morella. I'm very close to Mrs. Morella. I don't know whether she knows this or not, but in her home county of Montgomery County, Maryland, I've spent an awful lot of nights working with John Best on his sprinkler program up there.

As it has been testified before by Congressman Boehlert a little bit earlier, as stated earlier, and in other committees, the United States still suffers from a tragically high fire death rate. In fact, the U.S. still ranks number one in total fire deaths in industrialized nations world-wide.

I'm taking the speech that is given to you in print, and I'm using some excerpts from it, so I won't take quite as much time as this printed material says.

While the fire safety record in this Nation's hotels and motels has improved over the years, it still falls woefully short of proper fire protection for guests and employees. You've already mentioned the Bethlehem, Pennsylvania, fire, which took part of my speech, but it's a very, very important instance in the history of this Nation. According to the local officials in Bethlehem, a working sprinkler system in the area of the fire origin would have extinguished that fire.

Another tragic fire that we've already talked about this afternoon is Dupont Plaza, San Juan, Puerto Rico. Presently, the total cost of that fire is approaching $1 billion, including the lawsuits that are involved. Ninety-seven lives were lost, including a Federal FBI employee.

It is my understanding at the present time that they're rebuilding the San Juan, Puerto Rico, Dupont Plaza Hotel, but a decision has not been made yet whether to sprinkler it as they rebuild it or not. If that is the case, that's an extremely tragic situation in that company—country. I can't understand the fire officials and the building officials in that area that could even think about allowing that to be built without sprinklering it since they went through what they did.

Other fires that have happened in Texas and, as has been stated a little bit earlier, New York, and other communities—in the MGM fire it was stated that, had there not been a partial sprinkler system in the lobby of the MGM Hotel and sprinkler heads, they would have lost in excess of 2,000 people in that fire.

Now we're waiting on a tragic fire to happen. We're thinking 85, 97; folks, we're talking about thousands. We are waiting on that disaster to happen.

It doesn't have anything to do with hotels and motels, but when the Interstate Bank Building in Los Angeles burned, if that fire had occurred in the middle of the day, I don't know how many thousands of people would have died in that fire and we could—they could not have got them out of that building.

It's not just hotels and motels that I'm interested in, even though this House bill, H.R. 94, addresses hotels and motels; I'm interested in the whole gamut.

A number of hotel chains have already recognized the importance of systems in the protection of their guests and employees. The Marriott probably leads the way; I think the Hilton is in there with them. You know, they understand some things, that human beings take precedence over things, over buildings, over money; they understand those things. Sunny Scarf has been working with us for a long, long time in making those things happen in the Marriott Corporation. There's no reason other hotel chains can't and shouldn't do the same thing.

We have an obligation to the citizens which we protect to protect their lives, regardless of whether they're transient citizens or whether they are local citizens of Cobb County, Georgia.

The Marriott is installing or retrofitting sprinkler systems all over this country. All new Marriott hotels are being built sprinklered, and all other buildings owned by the Marriott Corporation in this country is being retrofitted. That ought to tell us something.

Many communities have also recognized the solution to some of the problems that we have in the Fire Service as relates to hotels and motels and, in my case, multi-family dwellings, condos, apartment, townhouses, or whatever you want to call them. The importance of H.R. 94 is, there is going to be a spill-off that helps us at a local jurisdiction, once it passes, to say to the people hotels and motels, multi-family—where there's a potential of multiple loss of life in a facility.

You know, what we're trying to do is protect a large group of people in this scenario from one person who either commits a crime or commits a mistake, if it's an accidental fire, or it can be an intentional fire. I use the same scenario, and I flew in on Delta this morning, guys. I looked around in this 757, and we've got about 125 people on this plane, and our lives are in the hands of one person, the pilot. If he makes a mistake, we die. Do the same thing in any hotel in this Nation. If that person on the first floor makes a mistake, we die.

So it's not—it's a tremendous burden that we have to make sure that we protect those people that are going into that hotel, and, as was testified earlier, they don't really know whether it sprinklered or not, they don't check whether it's got smoke detectors or not, and that's true, but they need to go in with a feeling, or sense or feeling that they're protected in that building, and we're obligated to do that.

Many corporations, including the International Association of Fire Chiefs, has already adopted policies to only use sprinklered hotels and motels for its functions whenever or wherever it is possible. For your information, we just cancelled one conference, the Southwestern Division of the IFC, because it was an unsprinklered motel; we're going to move it somewhere else.

The provisions to require smoke detectors must not be eliminated. The early warning smoke detectors, coupled with quick response fire sprinklers, will provide the best combination of life safety and property protection in any structure.

In my county, we have started sprinklering some seven years ago multi-family dwellings. Today, we have 60,000 multi-family units sprinklered in my community, along with hotels and motels. We have had 46 activations in those units using fast response technology that is addressed in this bill; we've identified 21 real live human beings that we have name, rank, and serial number on, that we can identify today; they're alive today that would have died in those fires.

Folks, there's a better way of doing what we've been doing than the way we've been doing it.

The process outlined in H.R. 94 requiring the Fire Administration and other agencies to develop guidelines is supported by the International Association of Fire Chiefs. We believe that the Fire Administration has an appropriate role in this area. The current issue of the Federal travel directory, which I hold in my hand and we've been talking about for the last 45 minutes—ISS number 02780941(h), number 94, dated December 1988—uses symbols to designate amenities of each hotel or motel. What would be wrong with a sprinkler head on one of those symbols? You hit it right on the head, Congressman Morella.

Something that's important as I read this—and not too many people don't have this, by the way; I happened to find one in my manager's office yesterday. In the back of this book—and I don't know how many Federal employees are in this room, but I wonder how many of them have read page 608. I'm not going to read the page, but I'm going to tell you something it says: "When you suspect fire, keep your body as close to the floor as possible. Vent the room of smoke if your bathroom fan is working. Notify hotel management. Fill the bathtub with water, wet sheets, or towels, and stuff space between doors and windows to block smoke. Bail water on to doors and walls to keep surfaces wet and cool. Place a wet towel around your nose and mouth to filter smoke. Use the elevator during"—how many people bother to read this, when it could say, "This unit, this hotel, is sprinklered; therefore, disregard the following"?

Thank you very much.

[The prepared statement of Mr. Hilton follows:]

STATEMENT OF
CHIEF W. D. HILTON
SECOND VICE PRESIDENT
OF THE
THE INTERNATIONAL ASSOCIATION OF FIRE CHIEFS
BEFORE THE
U. S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
SUBCOMMITTEE ON SCIENCE, RESEARCH AND TECHNOLOGY

THE HOTEL AND MOTEL FIRE SAFETY ACT OF 1989
H. R. 94
MARCH 2, 1989
WASHINGTON, D.C.

For further information contact:

Mr. Timothy P. Butters
IAFC Government Affairs
(202) 833-3420

My name is Dave Hilton and I am the Fire Chief from Cobb County, Georgia and I am here as the 2nd Vice President of the International Association of Fire Chiefs. It is my distinct honor to testify before this committee on behalf of the International Association of Fire Chiefs and Operation Life Safety. The IAFC is the professional association representing nearly 10,000 chief fire officers and senior managers who are responsible for the delivery of fire protection and the emergency medical care throughout the United States.

I would like to preface my remarks by commending you, Chairman Walgren, Congressman Boehlert and Congressman Walker for reintroducing HR94, the Hotel and Motel Fire Safety Act of 1989.

As has been testified before this and other committees, the United States still suffers from a tragically high fire death rate. Although much progress has been made through efforts of the U.S. Fire Administration, the National Fire Academy, nation's fire chiefs, the private sector, and other organizations, the death rate is still unacceptable. In fact, the U.S. still ranks number one in total fire deaths in industrialized nations worldwide. According to actual reports to the U.S. Fire Administration, in 1986, there were nearly 4000 fires in hotels and motels, resulting in 24 deaths, 317 injuries, and a property loss of $29 million. The National Fire Protection Association's (NFPA) Hotel Fire loss estimates for 1986, which are twice as high in each category, suggest the hotel fire loss is probably worse, since not all fire departments report their fire loss data to the

USFA. The Dupont Plaza fire, in one incident alone, had four times more hotel fire deaths than the United States did in all of 1986.

While the fire safety record in this nation's hotels and motels has improved over the years, but it still falls woefully short of proper fire protection for guests and employees. In the past few weeks, a fire occurred in a Bethlehem, Pennsylvania hotel and took the lives of five persons. According to local officials, a working sprinkler system in the area of fire origin, would have extinguished that fire, or kept it small enough and in check until the fire department arrived. Another tragic fire, at the Dupont Plaza Hotel in San Juan, Puerto Rico, took the lives of 97 hotel guests. That incident is simply a repeat of the fires that occurred earlier this decade, twice in Las Vegas, Texas, New York and other communities. In fact, had it not been for a partial sprinkler system in the Las Vegas MGM, officials feel another 2000 people would have perished in that incident alone.

A number of hotel chains have recognized the importance of these systems for the protection of guests, employees and their property, and have begun to install complete quick-response sprinkler systems/smoke detectors in all their hotel properties. The most well known example is the Marriott Corporation. They are installing sprinklers in their new construction and are retrofitting existing properties.

Many communities have recognized the importance of quick-response sprinkler and smoke detector systems. A number of localities have enacted legislation that either strongly encourage or require sprinklers and smoke detectors in all newly constructed hotel, motels, garden apartments, single-family dwellings and townhouses. In my community alone, we have now over 60,000 multi-family, hotel, motel, and garden apartment units installed with sprinklers and smoke detectors. Over the past five years, we have had 46 activations, with no single incident exceeding $500.00 in total fire loss. There have been no deaths and only two minor injuries. We can positively identify 23 citizens alive today, who would have died as a result of these fires had it not been for the presence of sprinklers and smoke detectors.

The legislation you have introduced is a laudable beginning. The International Association of Fire Chiefs and Operation Life Safety clearly support the intent of the Hotel and Motel Fire Safety Act of 1989, and we feel the inclusion of both new and existing properties and time frames for compliance cited are reasonable.

As is dictated in the proposed bill, we feel that the federal government should take the lead in the promotion of good fire safety practice by requiring its employees to make every effort to stay in fully protected properties. Many corporations, including the IAFC, has adopted as policy only use sprinklered hotels and motels for its functions whenever and wherever possible. We feel that it a strong statement to make toward the protection of any organization's most valuable resource, its people.

The provision to require smoke detectors must not be eliminated. The early warning smoke detector systems coupled with quick-response fire sprinklers will provide the best combination of life safety and property protection in any structure.

The incentives included in HR94, we feel, provide the appropriate impetus for hotels and motels to install the systems. It is our feeling that state and local governments would also adopt similar policies, which would provide further incentives for hotel properties to install fire sprinklers and smoke detectors.

The process outlined in HR 94 requiring the U.S. Fire Administration and other agencies to develop guidelines by which places of public accommodation are designated as in compliance, we feel is sound. The IAFC feels that the USFA has an appropriate role in the development of those guidelines.

The current issue of the Federal Travel Directory (ISSN: 0278-0941 issue No. 94 dated December 1988) uses symbols to designate amenities of each hotel or motel. Consideration could be given to require each facility to prepare and return a simple form that is countersigned by the local fire official that would identify sprinkler and smoke detector application for the facility. This action would speed up the desired information retrieval identified in the bill.

In closing, although we have serious concerns about federal regulatory involvement in building and fire codes, we feel this bill embraces the incentives which will lead to the installation of fire sprinkler and smoke detection systems without compromising the authority of the local fire official. Passage of this act would be in the best interest of all Americans, including fire fighters. An unsprinklered hotel is a disaster waiting to happen, and it WILL happen if we fail to implement the sprinkler initiatives proposed in this bill.

I thank you for the opportunity to testify before this Subcommittee. I would be pleased to respond to any questions the members of the Subcommittee may have.

Mr. **Boehlert**. Thank you very much, Chief.

Mr. Reiss.

Mr. **Reiss**. Good afternoon.

My name is Martin H. Reiss. I am Chairman of the Board of the Gamewell Corporation, a division of Cerberus Technologies, Inc. My engineering background includes both a bachelor's and master's degree from MIT. Today, I am representing the National Electrical Manufacturers Association, where I have been Chairman of its Signaling, Protection, and Communications Section.

NEMA, with headquarters in Washington, D.C., is the Nation's largest trade association for manufacturers of electrical equipment. Its 600 member companies produce components or end-use equipment for the generation, transmission, distribution, control, and use of electricity. The Association's major activities include the development of domestic and international standards, statistical and marketing programs, Government relations, international trade, and industry leadership in new technologies.

The NEMA Signaling, Protection, and Communications Section strives to meet the needs of the public interest with quality products and services, encourages innovation, and advances the understanding and application of life safety technology. The Section has standing committees on research, standards, training and education, building codes, field performance, and product safety that work to meet these goals.

NEMA completely supports the findings and purpose of H.R. 94, calling for hotels and motels to be equipped with both automatic sprinkler and automatic smoke detection systems. Sprinkler and smoke detection systems complement each other in providing a balanced approach to early warning, suppression, and control of fire conditions. Both systems are necessary.

In the past two years, full-scale fire test research on the response of smoke detectors and sprinklers in hotel occupancies has been conducted by Factory Mutual Research under sponsorship by the Federal Emergency Management Agency through its United States Fire Administration. The results of the first test program on hotel occupancies were published in May 1988 and considered primarily flaming fire scenarios. Smoke detectors responded sufficiently in advance to provide significant warning to the occupants seeking to escape before smoke build-up.

The second of the test programs were published in November 1988 and considered smoldering fire scenarios, simulating those fires caused by cigarette ignition of bedding materials.

A total of four fire tests were conducted. The temperature at the ceiling increased to the necessary level for sprinkler actuation in just one of the four tests. However, in all four tests, the tenability level for carbon monoxide was exceeded in the room foyer. The average early warning by room smoke detectors was 2 hours and 42 minutes before this condition was achieved, and, as you know, carbon monoxide is a major cause of death in fire fatalities.

In addition, in the one test scenario with the door to the corridor open and with normal corridor ventilation, the carbon monoxide tenability in the corridor was also exceeded. All corridor smoke detectors responded in this open door test such that warning of this dangerous condition could have been given to the other hotel occupants by the corridor detectors connected to the building fire alarm system.

Copies of these reports have been submitted to the subcommittee staff already.

Recent fires with major life loss, such as the MGM Grand, Stouffer's Inn, and Dupont Plaza hotels, resulted from fires ignited in public areas. Early warning smoke detection systems in corridors and public areas could have provided the necessary notification for significant reduction in life loss.

The Life Safety Code, as well as other model building codes for hotel occupancies, requires electrical supervision of the sprinkler system to monitor any condition that will impair its operation, such as control valves and the fire pump. The code also requires the sprinkler system, when provided, to actuate the building fire alarm system for notification of building occupants.

It is our recommendation that the committee report and legislation clearly indicate the requirements for electrical supervision of the sprinkler system and audible alarms to notify the staff and guests via the building fire alarm. In addition, we very strongly recommend the inclusion of system smoke detectors in the corridors and public areas as well as single station smoke detectors in the guest rooms.

The fire detection and alarm system should be installed in accordance with the appropriate NFPA/ANSI 72 series of nationally recognized standards for the installation of fire protective signaling systems.

In developing the guidelines for fire safety required by this bill, we would strongly recommend the use of these voluntary standards. They are in use and are well understood by the fire protection and building communities. In addition, their use is consistent with OMB Circular A-119, which requires Federal agencies to use voluntary standards whenever feasible in regulatory activities.

Thank you for the opportunity to present our views today. I would like to close by commending the sponsors of this important legislation and to the subcommittee staff in their efforts to address the concerns that are set forth in the findings and purpose of this bill.

On behalf of the smoke detection and alarm industry, I want to assure you of our desire to be helpful and cooperative during the implementation of this legislation. Thank you.

[The prepared statement of Mr. Reiss and technical reports on the response of smoke detectors and sprinklers in hotel occupancies follow:]

STATEMENT

OF MARTIN H. REISS

REPRESENTING THE
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
BEFORE THE
U.S. HOUSE OF REPRESENTATIVES
SCIENCE, RESEARCH AND TECHNOLOGY SUBCOMMITTEE
OF THE
SCIENCE, SPACE AND TECHNOLOGY COMMITTEE
ON H.R. 94
THE HOTEL-MOTEL FIRE SAFETY ACT OF 1989
MARCH 2, 1989
2318 RAYBURN HOUSE OFFICE BUILDING

My name is Martin H. Reiss, I am Chairman of the Board of the Gamewell Corporation, a division of Cerberus Technologies, Inc. My educational background includes both a Bachelor and Master of Science degree from the Massachusetts Institute of Technology.

Today, I am representing the National Electrical Manufacturers Association where I am Chairman of its Signaling, Protection and Communications Section.

NEMA, with headquarters in Washington, D.C., is the nation's largest trade association for manufacturers of electrical equipment. Its 600 member companies produce components or end-use equipment for the generation, transmission, distribution, control and use of electricity.

The Association's major activities include the development of domestic and international standards, statistical and marketing programs, government relations, international trade and industry leadership in new technologies.

The NEMA Signaling, Protection and Communications Section strives to meet the needs of the public interest with quality products and services, encourages innovation and advances the understanding and application of life safety technology. The Section has standing committees on research, standards, training and education, building codes, field performance and product safety that work to meet these goals.

I have been active for many years in fire protection. My activities include membership on the Board of Directors of the Society of Fire Protection Engineers. I was also elected Vice-Chairman of Operation Life Safety, a group consisting of the public and private sectors working with the International Association of Fire Chiefs. Other elected positions include president of the Automatic Fire Alarm Association.

As a member of the National Fire Protection Association, I have been on its member advisory council since its inception, and am a member of various committees, including the Technical Committee on Detection Devices and the Life Safety Code Building Fire Protection Equipment Subcommittee. I am also on the Board of Trustees of the National Fire Protection Research Foundation.

In addition, I am proud of my membership on the Board of Advisors for the Graduate Program in Fire Safety Sciences at Worcester Polytechnic Institute.

NEMA completely supports the findings and purpose of H.R. 94, calling for hotels and motels to be equipped with both automatic sprinkler and automatic smoke detection systems. Sprinkler and smoke detection systems complement each other in providing a balanced approach to early warning, suppression and control of fire conditions. Both systems are necessary.

In the past two years, full scale fire test research on the response of smoke detectors and sprinklers in hotel occupancies has been conducted by Factory Mutual Research under sponsorship by the Federal Emergency Management Agency through its United States Fire Administration. The results of the first test program on hotel occupancies were published in May 1988 (FRMC J.I. OM3N5.RA(4)) and considered primarily flaming fire scenarios. In these flaming fire tests, smoke obscuration approached 100% before sprinkler actuation and remained at these levels after sprinkler actuation in all tests. Smoke detectors responded sufficiently in advance of sprinklers to provide significant early warning to occupants seeking to escape.

The results of the second test program were published in November 1988 (FMRC J.I. OQOR4.RA) and considered smoldering fire scenarios, simulating those fires caused by cigarette ignition of bedding materials.

A total of four fire tests were conducted. The temperature at the ceiling level increased to the necessary level for sprinkler actuation in just one of the four tests. In all four tests, the tenability level for carbon monoxide of 43,000 parts per million-minutes was exceeded in the room foyer.

The average early warning by room smoke detectors was 2 hours and 42 minutes before this condition was achieved. Carbon monoxide is a major cause of death in fire fatalities. In addition, in the one test scenario with the door to the corridor open and with normal corridor ventilation, the carbon monoxide tenability limit in the corridor was also exceeded. All corridor smoke detectors responded in this open door test, such that warning of this dangerous condition could have been given to other hotel occupants by the corridor detectors connected to the building fire alarm system.

Recent hotel fires with major life loss, such as the MGM Grand, Stouffer's and the Dupont Plaza hotels, resulted from fires ignited in public areas. Early warning smoke detection systems in corridors and public areas could have provided the necessary notification for significant reduction in life loss.

There has been much concern over the additional cost for the inclusion of automatic smoke detection in all corridors and public areas. (Single station room smoke detectors are not included in this analysis since they are already a part of the legislation.) An incremental cost analysis indicates that this cost is minimal when the automatic sprinkler and smoke detection systems are installed at the same time.

The NFPA 101 Life Safety Code, as well as other model building codes for hotel occupancies, requires electrical supervision of the sprinkler system to monitor any condition that will impair its operation (such as control valves, fire pump, etc.). The code also requires the sprinkler system, when provided, to actuate the building fire alarm system for notification of building occupants.

The cost for installation of a sprinkler system varies, depending on whether it is new construction or retrofit, uses plastic or metal pipe, or has exposed or hidden piping. Local labor rates also impact on cost.

As an example, we can assume a typical cost in retrofit of $2.70 per square foot for the sprinkler system. The additional cost for installing the required electrical supervision and audible alarms as part of the fire alarm is approximately an extra 30%, or $.81 per square foot for a total of $3.51 per square foot. The total additional cost for installing automatic system smoke detectors in the corridors and public areas is approximately 10%, or $.35 per square foot, for a total of $3.86 per square foot. If the corridor and public area smoke detectors are installed separate from the sprinkler system, the retrofit completely installed cost is approximately $350 per detector.

A 1988 report on "Fire Protection in the Lodging Industry" by the American Hotel and Motel Association indicates that 73% of hotel chains and 69% of independents already have smoke detection in the public and service areas in all hotels. Hotels with smoke detection in corridors is 70% in chains and 58% in independents.

The percentage for high-rise hotels is greater. In addition, almost all hotels have some type of an existing fire alarm system with audible alarms for notification of building occupants.

Considering the small incremental additional cost for automatic smoke detection coverage in corridors and public areas and that the majority of hotels already have some coverage, the cost impact is very minimal for the early warning life safety function of smoke detectors. An exception could be made for hotels under three stories with no interior corridors and immediate egress to the outside.

It is our recommendation that the Committee report and legislation clearly indicate the requirements for electrical supervision of the sprinkler system and audible alarms to notify the staff and guests. In addition, we strongly recommend the inclusion of an automatic fire alarm system with smoke detectors in the corridors and public areas, as well as single-station smoke detectors in guest rooms, installed in accordance with the appropriate NFPA/ANSI 72 series of nationally recognized standards for fire protective signaling systems.

In developing the guidelines for fire safety required by this bill, we would strongly recommend the use of voluntary standards. These standards are in use, and are well understood by the fire protection and building communities. In addition, their use is consistent with OMB Circular A-119, which requires federal agencies to use voluntary standards whenever feasible in regulatory activities.

Thank you for the opportunity to present our views today. I would like to close by commending the sponsors of this important legislation and to the subcommittee staff in their efforts to address the concern that are set forth in the findings and purpose section of the bill.

On behalf of the automatic smoke detection and alarm industry, I want to assure you of our desire to be helpful and cooperative during the implementation of this legislation.

Thank you.

FMRC J.I. 0Q0R4.RA

TECHNICAL REPORT

THE RESPONSE OF SMOKE DETECTORS TO SMOLDERING-STARTED FIRES IN A HOTEL OCCUPANCY

By
Robert G. Bill, Jr.

Prepared for:
Federal Emergency Management Agency
United States Fire Administration
Washington, D.C. 20472
and
The Signaling, Protection, and Communication Section
of The National Electrical Manufacturers Association
Washington, D.C. 20361

November 1988

Factory Mutual System

Factory Mutual Research

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The National Electrical
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Washington, DC 20035

FMRC J.I. OQOR4.RA
070 (A)

November 1988

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ABSTRACT

Four smoldering-started fire tests were conducted in a simulated hotel guest room and corridor to evaluate the performance of light-scattering and ionization smoke detectors. In all four tests, smoldering was initiated in a bed using a commercial resistive heater supplied with 42 watts. The bed was in compliance with the Federal Mattress Flammability Standard and was acquired from a hotel furnishings vendor. Each test in the series was distinguished by a different ventilation condition. In Test 1, the guest room was unventilated and the door to the corridor was closed. The same conditions were used in Test 2, except the guest room door was open. In Test 3, the guest room door was closed and ventilation was supplied to the room at a rate of four room changes per hour. Corridor ventilation was fixed in Tests 1 through 3 at 1440 cfm, and air from the corridor flowed freely to an adjacent test building. In Test 4, the guest room was unventilated and the door to the corridor was open. Ventilation to the corridor was reduced to 200 cfm (6 air changes per hour in the corridor), and flow out of the corridor was blocked.

Of the four tests, only Test 3 resulted in flaming combustion. In that test flaming occurred approximately 5 hours after the initiation of smoldering. An extended coverage, sidewall sprinkler equipped with a fast response link actuated and extinguished the fire. Sprinklers were installed in the other three tests, but did not actuate. Those tests were aborted six hours after smoldering initiation.

In all four tests, smoke detectors in the guest room responded while the carbon monoxide concentration was less than 100 ppm and obscuration was less than 5%/ft. The time-integrated value of carbon monoxide at the 5 ft level in the foyer eventually exceeded 43,000 ppm-min in all four tests. (This level is the tenability limit adopted in the Los Angeles Residential Test Program.) The average advance warning by guest room detectors was 2 hr 42 min before this condition was achieved. Maximum obscuration levels in the guest room were greater than 60%/ft in all tests except Test 2 in which the guest room remained relatively clear and obscuration did not exceed 15%/ft. Corridor detectors in this study responded in Tests 3 and 4. The guest room was untenable at the time that corridor detectors responded (except for two detectors in Test 4). Results of the present tests indicate that from a life safety viewpoint hotel guest rooms and corridors should be fully equipped with early warning smoke detectors and fully sprinklered.

ACKNOWLEDGMENTS

We would like to express our gratitude to the U.S. Fire Administration for their sponsorship of the previous study of smoke detectors in hotel occupancies at FMRC, which allowed the test facility and instrumentation used in the present study to be available. In particular Mr. Tom Smith's continuing support of research in life safety technology has been invaluable. We would also like to express our thanks to Mr. Mickey Reiss of the Gamewell Corporation, Mr. Joseph Drouin of Simplex and Mr. Frank Carideo of Fire Control Instruments for their helpful comments throughout the test series. The technical assistance of Mr. Louis Desmarais of Simplex and Mr. Robert Elliot of Gamewell in the installation and maintenance of the detectors supplied by NEMA is gratefully acknowledged.

Mr. William Brown, Mr. Edward Hill, and Mr. Donald Mann of Factory Mutual Research were responsible in this study for installing instrumentation and conducting the fire tests. Their performance was exemplary. We express our thanks to Mrs. Eleanor Knight for her editorial support.

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1
INTRODUCTION

1.1 THE IMPACT OF SMOLDERING FIRES ON LIFE-SAFETY

The most common single cause of fire fatalities in the United States has been estimated for many years to be the smoldering-started ignition of bedding and upholstery materials by cigarettes [1-3]. In this scenario, described and modeled by Ohlemiller, Bellan and Rogers [4], smoldering combustion spreads from a dropped cigarette to the upholstery fabric and then into cushioning material. The smoldering process, although quite slow, can be an efficient generator of carbon monoxide. Typically such fire scenarios occur in residences; however, 48.6% of all deaths in hotel and motel fires also occurred due to use of smoking materials [5]. Associated with a smoldering fire is an increase in time before the discovery of the fire [6]. In this context it is interesting to note that a study by the National Fire Protection Association (NFPA) estimated that 68.8% of dwelling fire fatalities in the seventies occurred between 8:00 p.m. and 8:00 a.m. Of these fires, 25.5% required between 20 minutes and 40 minutes to discover and 37.8% required more than 40 minutes to discover [6].

While the initiation of smoldering combustion is clearly the cause of many fire fatalities, the degree to which fatalities are caused by toxic conditions created during the smoldering phase of the fire as opposed to conditions created primarily by flaming combustion remains unknown. In a study by Johns Hopkins University, post mortem examinations of 511 Maryland fire fatalities (64% of statewide fire deaths), carbon monoxide was involved in more than 80% of the cases, and 40% of the victims were intoxicated at the time of death [7]. In this context, it is important to recall two properties of smoldering fire: efficient production of carbon monoxide and slow relatively unobtrusive growth. Thus smoldering combustion may be the cause of fatalities in fires in which the victims were sleeping and/or intoxicated or incapacitated.

Despite advances in our understanding of self-sustaining smoldering, the complex nature of such combustion will, for some time, require highly empirical methods to be used to predict the smoldering characteristics of materials. A study by Ihrig, Rhyne and Spears [8] of the smoldering characteristics of fabric/foam combinations when exposed to lighted cigarettes illustrates this point. They developed an empirical model to predict ignition probabilities as a function of physical properties of fabrics, foams and cigarettes. Physical characteristics included air permeability of foam, fabric density, fabric ignition proclivity (burning rate) and calories per cigarette. The model was reasonably successful at providing a means of differentiating cigarette and fabric/foam combinations which would ignite; however, the model is quite sensitive to variation in fabric and foam properties. Thus it appears that the typical variations in fabricate substrate properties present in commercial upholsterd furniture would make use of the model difficult in practical situations.

It is noteworthy that the factors included in the empirical model of Ihrig et al [8] are similar to the factors which Ohlemiller, et al [4] found to be important in their theoretical physical model of self-sustaining smoldering combustion. These factors were the duration and heat flux level of the ignition source, flow of air through a polyurethane substrate, char formation rates, and physical properties which dictate heat conduction and radiation in the foam.

Perhaps the most practical result of research on smoldering-started combustion is the development of codes, such as the Federal Mattress Flammability Standard of 1973 which requires that mattresses pass tests which indicate resistance to ignition by smoldering cigarettes. Despite such advances, 14,500 residential fires ignited by cigarettes occurred in 1984. The fires resulted in 870 deaths and 1,510 injuries [3]. These statistics point to the need to continue to evaluate and implement new fire safety technologies.

The performance of fire safety technology such as smoke detectors and sprinklers has been evaluated for hotel occupancies in only a few full scale tests. In demonstration tests [9] conducted by the National Fire Protection Research Foundation in Fort Lauderdale, two smoldering-started tests were conducted in a simulated hotel guest room in which smoke detectors and an extended coverage horizontal sidewall sprinkler (ECHS) equipped with a fast response link were installed. In the first test a 1,000 watt iron was placed on a bed near the pillow, while in the second test a 1,500 watt iron was used. No forced ventilation was used, and the guest room windows and doors to the room were closed. In neither test did the smoldering phase of combustion progress to a flaming mode. The first test was terminated after 2 hours with no visible smoke present. In the second test, considerable smoke was generated; light transmission at the 5 ft level over a 1 meter path was reduced to 18%. Due to instrument malfunction, it was not possible to determine if carbon monoxide concentrations were life threatening. Photoelectric detectors in the room responded between 36 and 41 minutes into the test, while obscuration at the 5 ft level was less than 10% over a meter path length. Ion detectors responded approximately 1 hr 45 minutes into the test when obscuration was approximately 30%.

Smoldering-started fire tests were conducted in the Los Angeles Residential Test Program [10]. In that program, three tests were conducted in which smoldering was initiated in a bed by placing a lighted cigarette between the bed sheets at the upper portion of a double bed. In two of these tests, the door and window of the bedroom remained open. Transition to flaming occurred after a smoldering period of two to three hours. The prototype residential sprinklers actuated; the fire was extinguished, and life safety criteria for carbon monoxide and gas temperature were not exceeded. In the third test, a mattress of different construction was used and the door and windows of the bedroom were closed. Although transition to flaming never occurred, 5 hr 18 min into the test sprinkler actuation occurred. At this time the ceiling gas temperature was 143°F. The temperature rating of the sprinkler was 140°F. The carbon monoxide concentration had exceeded 5,000 ppm, 2 hr 35 min after the initiation of smoldering. The time-integrated value of carbon monoxide concentration exceeded 43,000 ppm-min, 1 hr and 52 min into the test. This was the carbon monoxide limit set as a standard for tenability. Kung, et al [10] noted "that the environment in the room of fire origin and along the escape route became too hazardous for people to survive after a smoldering period of about 1-1/2 hrs."

Recently, the U.S. Fire Administration (USFA) sponsored a series of eight flaming-started and four smoldering-started fire tests in a simulated hotel guest room and corridor [11]. In these tests, nine smoke detectors were installed in the guest room, and six smoke detectors were installed in the corridor. An ECHS sprinkler equipped with a fast response link was also installed to protect the sleeping area of the guest room, along with fast response, pendent sprinklers in the foyer and bathroom. In the eight flaming-started fire tests, all room smoke detectors responded, while obscuration in the room at the 5 ft level was less than 15%/ft and gas temperature was less than 100°F. The fire was suppressed in all eight tests by the ECHS sprinkler; it was deemed that an occupant in the room not in intimate contact with the fire would have survived. However, with gas temperatures at the 5 ft level within the guest room being between 200 to 250°F for up to 20 s, and obscuration approaching 100% at the time of sprinkler actuation, it was clear that the advance warning by smoke detectors would improve chances for escape. The report recommended that both smoke detector systems and sprinklers be installed in hotel guest room and corridors.

In the four smoldering-started fire tests, a tea cup immersion heater was placed between the folds of the bed sheets near the pillow. The tea cup immersion heater was energized with 40 watts of power. In only one of the four smoldering-started fire tests did flaming combustion eventually occur. In the other three tests, flaming was artificially induced approximately 1 hr into the test (after failure of the immersion heater) using a lighted match. The results of these tests were similar to the eight flaming-started fire tests. In the single test in which transition to flaming occurred spontaneously (apparently due to the high temperature achieved by the immersion heater), flaming occurred 17 minutes into the test. The smoke detectors in the guest room responded as much as 5 minutes earlier, with four detectors responding approximately at the time flaming started. The sprinklers actuated approximately 3 min later. Results were again similar to those observed in the eight flaming-started tests. In none of the four tests did self-sustained smoldering combustion appear to have been obtained as seen in either the Los Angeles Residential Test Program [10] or in one of the smoldering tests of the Fort Lauderdale Study [9]. Under conditions in which smoldering is self-sustained, it is anticipated that the importance of advance warning by smoke detection would be more significant than in flaming-started tests. Thus, a recommendation of the report [11] was that "further tests which realistically simulate smoldering-started fires should be undertaken to determine the performance of sprinklers and detectors under such conditions." With this background, NEMA undertook to sponsor four additional smoldering-started fire tests using the same simulated hotel guest room and corridor constructed under the sponsorship of the USFA.

1.2 TEST OBJECTIVES AND PERFORMANCE CRITERIA

As mentioned in the previous section, the four smoldering-started fire tests of the present program are an outgrowth of the USFA hotel occupancy study reported in [11]. In that test series, flaming or smoldering was initiated in a bed since bedroom fires account for 58% of all fire incidents and 44% of all deaths in hotel fires [12]. In the present study, we have again designed a series of tests involving a single model bed purchased from a hotel furnishings vendor (the same bed as that used in [11]). The external source of heat used to initiate smoldering was a commercial cartridge heater supplied with 42 watts of power. Our intent, however, was not to simulate specific external sources (cigarettes, electric appliances, lamps, etc.), but to determine as a function of ventilation conditions the test room environments which could result from the self-sustained smoldering which occurred following the removal of the external heat source. The response of smoke detectors in the guest room and corridor and the performance of sprinklers installed in the guest room could then be evaluated with respect to life-safety criteria. Details of the test plan are given in Section III.

The life-safety criteria selected for this study are the same as that used in the USFA hotel study [11] and the Los Angeles Residential Test Program [10]. The time-integrated value of the concentration of carbon monoxide is not to exceed 43,000 ppm-min and the gas temperature at the 5 ft level is not to exceed 200°F. These limits, which are associated with incapacitation of healthy fire victims and inability to escape, represent practical life safety guidelines consistent with our present understanding of the effects of fire products on human health. Some recent reviews of research on causes of deaths in fires are available in [13-16]. Carbon monoxide is generally considered to be the primary contributor to death in fires [13-16]. Inhalation of carbon monoxide at levels above approximately 100 ppm results in the formation of carboxyhemoglobin which results in a decreased supply of oxygen to body tissues. Other causes include narcosis from inhalation of hydrogen cyanide, low levels of oxygen and high levels of carbon dioxide as well as effects due to heat. Hartzell [16], however, suggests that "in most real, full-scale, multi-material fires, ...to a good first approximation, tenability limits can be predicted solely on the basis of carbon monoxide produced" [14]. Maximum survivable levels of carbon monoxide depend on time duration. A common method of accounting for the role of time in determining physiological effects of toxic gases is Haber's rule [15]. Haber's rule as applied to a single gas suggests that physiological effects for a given time-integrated value of gas concentration are equivalent. For example, Hartzell [14] suggests values of from 35,000 to 45,000 ppm-min of carbon monoxide as limits beyond which incapacitation (escape impairment) would be expected to occur. This range is consistent with the 43,000 ppm-min limit set in the Los Angeles Test Program [10]. If the effects of more than one gas are to be estimated, models expanding this use of Haber's rule to multiple gases are currently available [15].

Haber's rule is a linear approximation which provides a convenient method of evaluating toxic hazards. It is known to lose validity at low gas concentrations [15]. A more accurate model such as the Coburn-Forster-Kane model [15] provides a means of predicting deviations from a linear model of carbon monoxide-uptake. Quintiere, Birky, MacDonald and Smith [17] adopted this method to predict the time for incapacitation due to carbon monoxide in smoldering fires. Assuming that the incapacitation is associated with a carboxyhemoglobin level of 20% and that this level occurs in 150 minutes or less, they showed, however, that the criterion for carbon monoxide exposure could still be approximated with Haber's rule, i.e., as a limit on the time-integrated value of the carbon monoxide concentration. Attainment of the 20% carboxyhemoglobin level corresponded to a limit of 45,000 ppm-min. This is consistent with the limits suggested by Hartzell [14] and the time period of 150 minutes is comparable to the critical periods reported in the present study.

The lethal limit on carbon monoxide can be estimated from data cited in Reference 13. A limit of 4,000 ppm is cited for an exposure of one hour. Using Haber's rule, we estimate a time integrated value of 240,000 ppm-min.

Physiological effects of elevated gas temperatures on humans are also known to depend upon time. For example, data cited in Reference 13 indicates 60 min toleration time at 158°F with decreasing toleration time at higher temperatures. At 264°F, a 5 min toleration time is cited. They note however that very rapid skin burns would be expected to occur at 212°F in humid air. In this context, the tenability limit of 200°F used in the Los Angeles Residential Test Program [10] appears reasonable.

Additional discussion of the life safety criteria is given in Reference 11. We repeat here, however, several cautionary points. The survivability criteria assumes that room occupants are not directly engulfed in flames nor do they remain very close to the fire source. Furthermore, the criterion for carbon monoxide does not take into account additive or synergistic effects of other toxic gases fuel as that of HCN and HCl [15]. We also note that the effect of obscuration is not included in our life safety criteria. As noted in our previous review of life safety [11], obscuration can significantly affect human behavior and thus impair the ability of a person to escape. Obscuration limits between 6 and 29%/ft are noted in [11]. However, as in previous fire tests [9-11], it will be assumed that a person could survive to be rescued, even if obscuration exceeds these levels, if the life safety criteria are satisfied.

II
EXPERIMENTAL FACILITIES

2.1 TEST FACILITY

The test facility was the same as that used in the previously reported USFA Hotel Fire Test Series [11]. Complete details of the facility are given in [11]. Figure 1 shows a plan view of the facility. Dimensions of the room are typical of hotel guest rooms in the United States. The location of supply and return ventilation registers is also noted in Figure 1. The room air supply registered was metered to supply four room changes per hour (based upon the volume of the bathroom, foyer and living area) when employed; the exhaust fan in the bathroom was a commercial 100 cfm fan; and the room air return was a 16 in. x 16 in. passive metered return connected to an 8 ft stack (see Appendix C and Reference 11).

The guest room shown in Figure 1 connected through a doorway (6 ft 10 in. x 2 ft 7 in.) to a simulated hotel corridor. The corridor, 8 ft high by 6 ft wide was 38 ft 8 in. long and connected to an existing one-story test building ("HUD building," Figure 1) with dimensions of 23 ft x 38 ft x 8 ft. The hotel guest room and corridor were enclosed within a larger test volume (60 ft (L) x 40 ft (W) x 33 ft (H)). Fire products were vented through the corridor to the "HUD building" rather than to the surrounding enclosure to provide a simulation of smoke flow through a hotel. The location of the corridor air supply is shown in Figure 1. At that end, the corridor was blocked in order to keep air from being entrained from the surrounding enclosure into the corridor. The total flow supplied by the corridor air supply could then be precisely measured (see Reference 11).

The guest room and corridor were fabricated using 2 in. x 4 in. studs and 2 in. x 8 in. ceiling joists. The walls and ceiling were covered with 1/2 in. plaster board. Joint compound was used to seal the spaces between plaster boards.

Figure 2 shows an external view of the test facility. The outlines of the guest room and corridor are visible in this view. The ductwork along the roof of the corridor (near top of photo) and guest room (right of photo) were used to meter the air supplied to the corridor and room. The 8 ft stack connected to the passive return is also visible. The small compartment to the left of the guest room, was used to protect environmentally the computer data acquisition system.

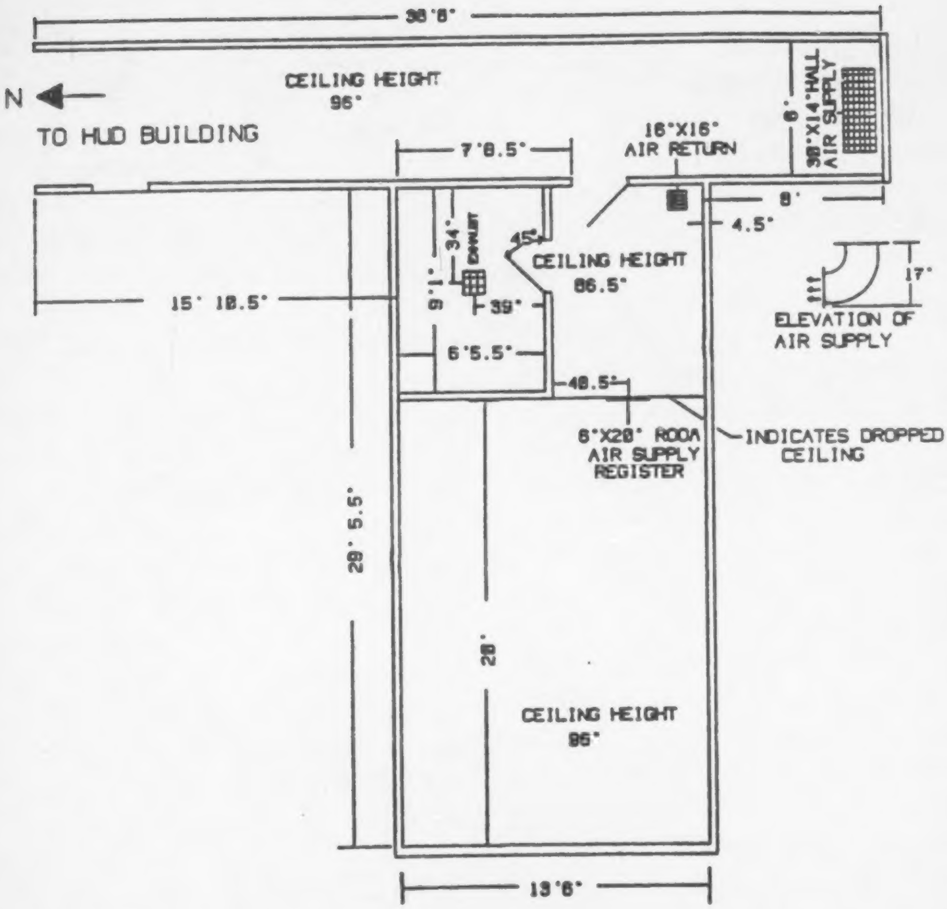
38'8"
CEILING HEIGHT
96"
N
TO HUD BUILDING
7'8.5"
16"X16"
AIR RETURN
6'
30"X14" HALL
AIR SUPPLY
8'
4.5"
45°
34"
EXHAUST
9'1"
39"
CEILING HEIGHT
86.5"
15' 10.5"
6'5.5"
17"
ELEVATION OF
AIR SUPPLY
40.5"
6"X20" ROOM
AIR SUPPLY
REGISTER
INDICATES DROPPED
CEILING
29' 5.5"
20'
CEILING HEIGHT
96"
13'6"

Figure 1. Plan View of Guest Room and Corridor.

Figure 2. External View of Test Facility.

2.2 FURNISHINGS AND SMOLDERING HEAT SOURCE

The bed used in this study was the same as that used in the USFA hotel study [11]. The bed mattress, box spring, and bedding materials were supplied by a New England hotel furnishings vendor. The bed mattress and box spring were in compliance with the Consumer Product Safety Commission Mattress Flammability Standard No. 16, Center for Fire Research 1632, and passed the Federal Flammability Standard. Nominal dimensions, weight and composition of the bed and bedding materials are shown in Table I. All bed furnishings were washed six times at a commercial laundry prior to use in the fire tests. The room was also furnished with a reclining chair, night stand, table, drapes and a 12 ft x 12 ft rug. None of these items became involved during the fire tests. A schematic of the room furnishings with dimensions is shown in Figure 3. A photographic view of the guest room is shown in Figure 4. The bedding arrangement, as shown in Figures 3 and 4, was the same in all four smoldering tests. A commercial cylindrical resistance heater (5/8 in. diameter x 2 1/2 in. long), located as shown in Figure 3, was placed so as to be in contract with the top and bottom sheets, and one pillow (see Figure 3). The heater was powered with 42 watts by a Variac.

2.3 SMOKE DETECTORS AND SPRINKLERS

Smoke detectors and sprinklers were installed as in the USFA hotel study [11]. All detectors were provided by the Research Committee of the Signaling, Protection, and Communication Section of NEMA. The locations of smoke detectors are shown in Figure 5. Numbers shown adjacent to the smoke detector symbols refer to the detector type indicated in Table II. Two different model light scattering detectors were used in the test program. (The models are indicated as "A" and "B" in Table II.) One model of ionization detector was used. The fifteen smoke detectors were grouped into five stations, each with two light-scattering detectors and one ionization detector. Two of the stations were on sidewalls and corresponded to typical locations in hotel rooms. Figure 6 shows a view of the detector station near the bed. An obscuration meter in front of the station is also visible in Figure 6 (see Section 2.4). The ceiling detector station in the center of the room (Detectors 7, 8, 9) provided information at a location fully instrumented for gas sampling, temperature, and smoke obscuration. A ceiling detector station outside the guest room door (Detectors 13, 14, 15) provided information on

OQOR4.RA

TABLE I
BED FURNISHINGS

Item and Dimension	Manufacturer/Model	Description of Key Contents
Bed Mattress (53"x75"; 60 lb)	Serta/Northeast/SE-3	50% blended cotton felt 50% polyurethane
Box Spring (53"x75"; 54 lb)	Serta/Northeast/SE-3	Cellulose fiber pad
Sheets (81"x104"; 1.25 lb)	Stevens/81" x 104"	Polyester/cotton percale
Blanket (80"x90"; 2.75 lb)	Manetta Mills Inc./ Regency Full	Acrylic
Pillows (20"x26"; 1.25 lb)	Purofield Down Products Corp./20"x26"	Polyester fiber

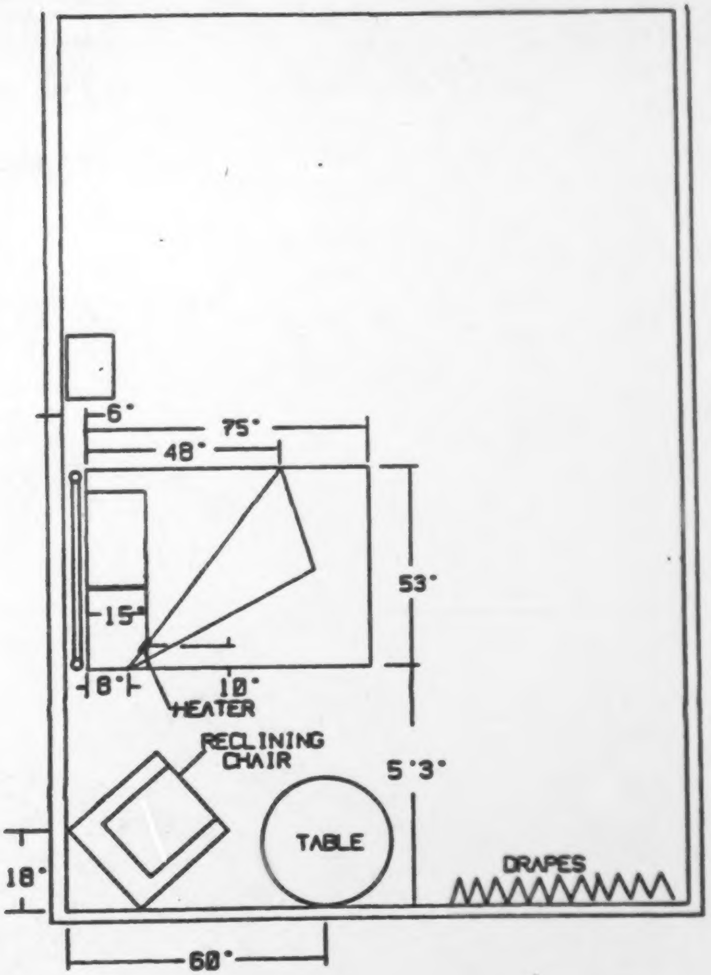
6"
75"
48"
53"
15"
8"
10"
HEATER
RECLINING CHAIR
5'3"
TABLE
DRAPES
18"
60"

Figure 3. Arrangement of Furnishings in the Guest Room.

Figure 4. View of Furnishings and Bedding Materials Arrangement.

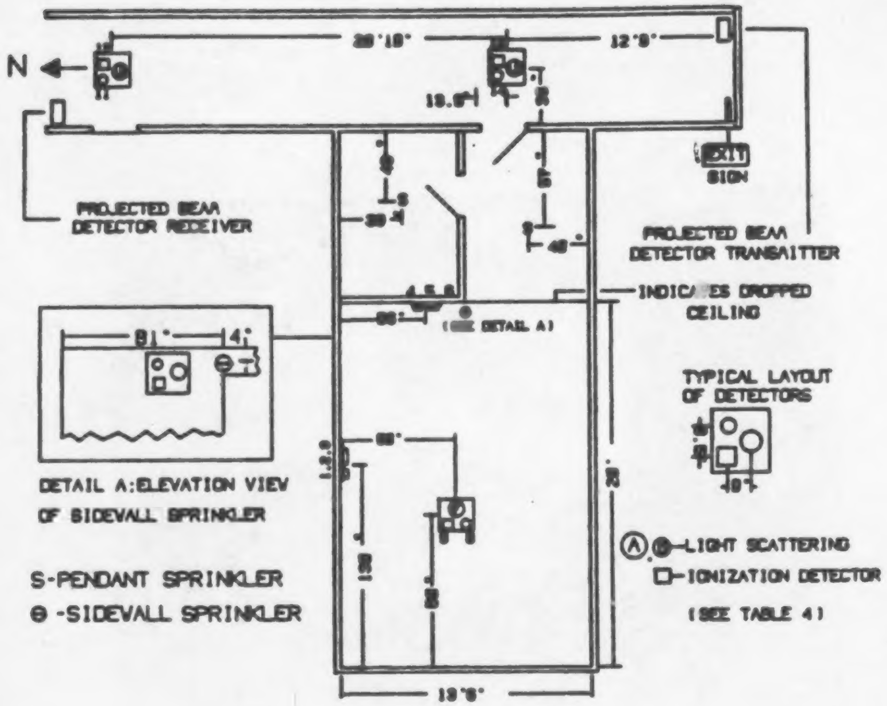
N
28'10"
12'9"
13.5"
EXIT SIGN
PROJECTED BEAM DETECTOR RECEIVER
PROJECTED BEAM DETECTOR TRANSMITTER
39"
40"
4,5,6
INDICATES DROPPED CEILING
(SEE DETAIL A)
81"
4"
DETAIL A: ELEVATION VIEW OF SIDEWALL SPRINKLER
TYPICAL LAYOUT OF DETECTORS
S-PENDANT SPRINKLER
⊖ -SIDEWALL SPRINKLER
Ⓐ,Ⓑ-LIGHT SCATTERING
☐-IONIZATION DETECTOR
(SEE TABLE 4)
13'6"

Figure 5. Sprinkler and Smoke Detector Locations.

TABLE II

SMOKE DETECTOR TYPES AS SHOWN IN FIGURE 5

No.	Type
	Guest Room Detectors
1	Light-Scattering A
2	Light-Scattering B
3	Ionization
4	Light-Scattering A
5	Light-Scattering B
6	Ionization
7	Light-Scattering A
8	Light-Scattering B
9	Ionization
	Corridor Detectors
10	Light-Scattering A
11	Light-Scattering B
12	Ionization
13	Light-Scattering A
14	Light-Scattering B
15	Ionization

Figure 6. View of Smoke Detector Station and Obscuration Meter Near the Bed.

minimum response times that could be expected from corridor detectors. Detectors 10, 11 and 12 were placed nominally 21 ft away from the door, the maximum distance a station would be from a doorway in a typical corridor installation, NFPA 72E [18]. The light-scattering detectors had a nominal sensitivity of 3%/ft obscuration, while the ionization detectors had a nominal sensitivity of 1%/ft obscuration (sensitivities supplied by NEMA). A projected beam detector (provided by NEMA) was also installed in the corridor 7 in. below the ceiling level. The beam, approximately 2 in. in diameter, diagonally traversed the corridor (Figure 5) and provided an analog output approximately linear with light transmission over the range 35% to 100%. Sprinklers were installed in each test as in the USFA hotel study [11]. In each test, one ECHS sprinkler equipped with a fast-response link and two pendent sprinklers equipped with fast response links were installed with the deflectors 4 in. below the ceiling at the locations shown in Figure 5. The same model ECHS sprinkler and the same model pendent sprinklers were used throughout the test program. Both types of sprinklers were 1/2 in. orifice sprinklers with a temperature rating of 165°F and a nominal K factor of 5.5 gpm/psi$^{1/2}$. The RTI of the ECHS sprinkler measured in a plunge test, with the frame arms of the sprinkler parallel to the gas flow, was determined to be 53 (ft-s)$^{1/2}$ for three samples. The RTI of the pendent sprinkler, measured in the normal position, was 47 (ft-s)$^{1/2}$. The coverage area for the ECHS sprinkler was the entire living area of the guest room. The pendent sprinklers were installed for coverage of the bathroom and foyer.

Water could be supplied during a single test to as many as three sprinklers. The flow rates for each sprinkler were independently monitored by rotometers. The flow rate for the ECHS sprinkler was 32 gpm as specified by the manufacturer. This provided an average water application density of 0.12 gpm/ft^2 for the coverage area of the guest room. The flow rate for each of the pendent sprinklers was set at 25 gpm.

2.4 INSTRUMENTATION

Complete details of instrumentation used in this program are reported in [11]. The instrumentation for gas analysis, obscuration, and gas temperature are of particular significance to this program.

The locations of gas sampling ports in the guest room and corridor are shown in Figure 7. Four gas sampling locations are shown in Figure 7. At all locations, gas sampling occurred at a rate of approximately 10 ℓ/min. The gas samples were drawn to analyzers through 1/4 in. nylon tubing. Gases were passed through a desiccant prior to entering the analyzers. Carbon monoxide and oxygen concentrations were obtained at each sampling location using Beckman 864 and 755 analyzers, respectively. At the center of the living area of the guest room, 3.5 in. below the ceiling and 5 ft above the floor (see Figure 7), carbon dioxide was obtained using Beckman 755 analyzers (see detail in Figure 7).

Locations of obscuration meters are shown in Figure 8. Obscuration meters were located at four locations within the living area of the guest room (three at the ceiling level; one at the 5 ft level in the center of the room; see detail in Figure 8). The three ceiling-mounted obscuration meters were constructed using the design of Newman and Steciak(19). The pathlength for these obscuration meters was 1 ft. The center ceiling instrument measured obscuration at three wavelengths, 0.4579, 0.6328 and 1.06 microns. The obscuration meter at the 5 ft level was modified from a commercially available obscuration meter (see Figure 4). The pathlength for this meter was 1 ft and the wavelength was 0.94 microns. The other two guest room obscuration meters were operated at a wavelength of 0.4579 microns.

Three obscuration meters were installed in the corridor (two at the ceiling level; one at the 5 ft level outside the guest room doorway). All three meters followed the design of Newman and Steciak [19]. The pathlengths for these meters were 1 ft, and the wavelengths for all three meters were 0.4579 microns.

Obscuration data reported here has been corrected to correspond to a wavelength of 0.555 microns, the peak in sensitivity of the human eye. This correction technique is discussed in Reference 11, where data are also shown supporting the validity of the correction.

Gas temperature was measured in this study using thermocouples, fabricated from inconel-sheathed 30-gage chromel-alumel wire. The locations of thermocouples of particular importance to this study are shown in Figure 9.

In addition to this instrumentation, we note that the response times of all detectors and actuation times of all sprinklers were also recorded. In each of the tests, data from the instrumentation was acquired using an ADAC

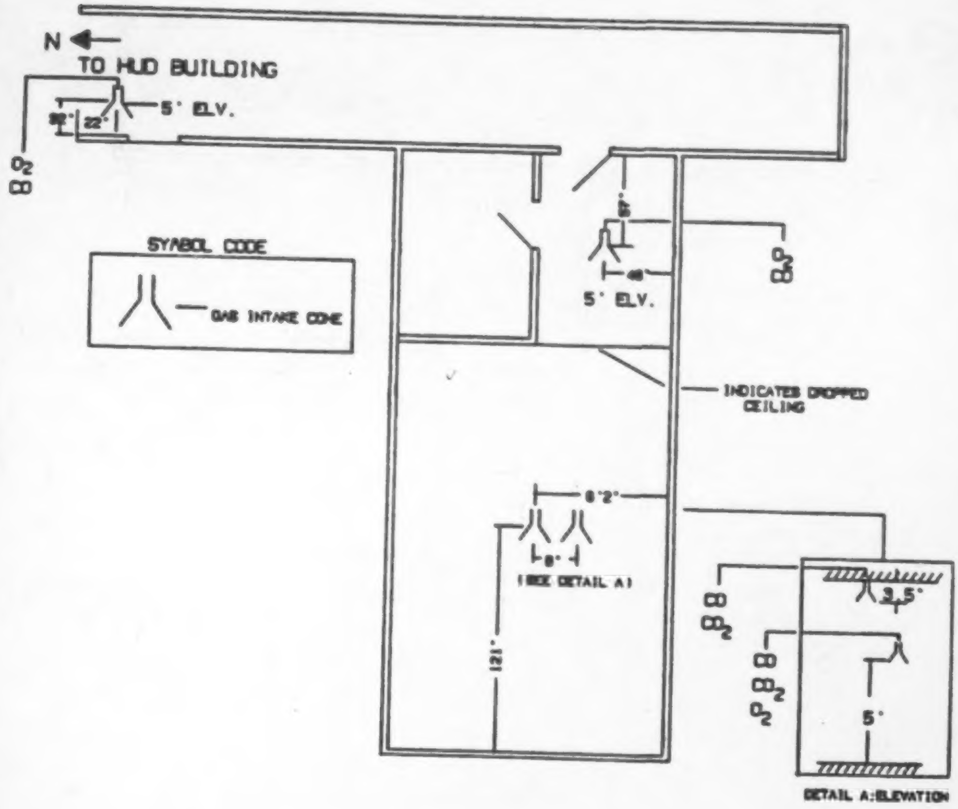
N
TO HUD BUILDING
5' ELV.
32"
22"
CO
O2
SYMBOL CODE
GAS INTAKE CONE
57"
48"
5' ELV.
CO
O2
INDICATES DROPPED CEILING
8'2"
8"
(SEE DETAIL A)
121"
CO
CO2
CO
CO2
O2
3.5'
5'
DETAIL A:ELEVATION

Figure 7. Gas Sampling Locations.

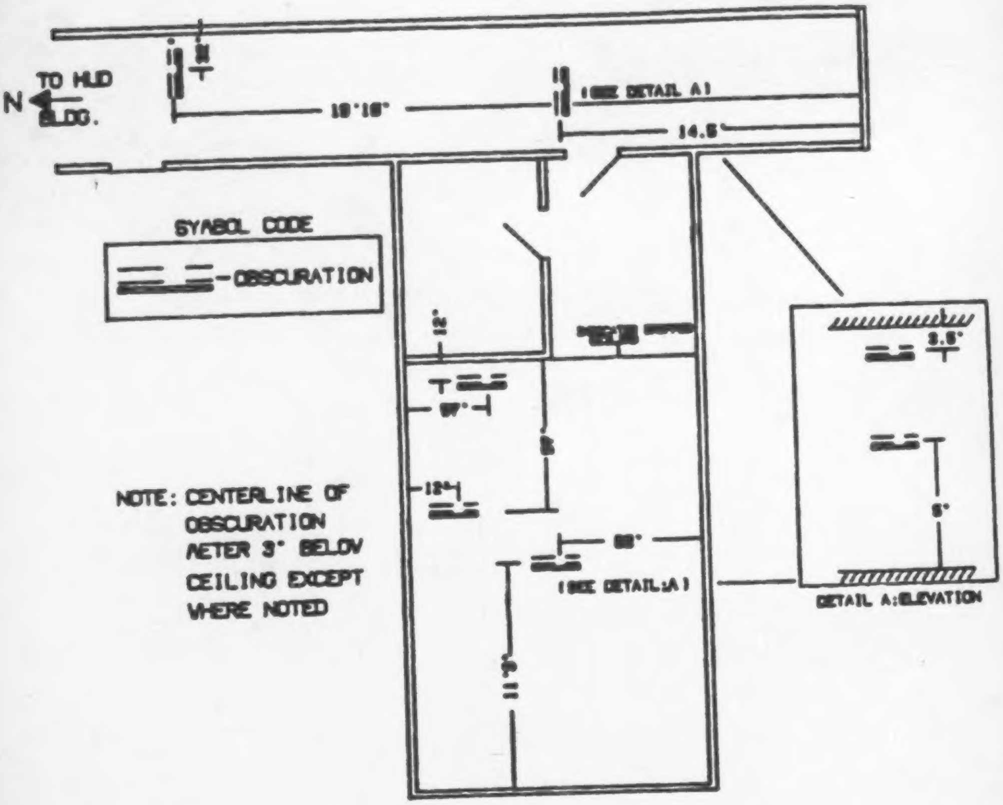
TO HUD
N
BLDG.
19'10"
(SEE DETAIL A)
14.5'
SYMBOL CODE
-OBSCURATION
12"
97"
12"
88"
(SEE DETAIL:A)
NOTE: CENTERLINE OF
OBSCURATION
METER 3" BELOW
CEILING EXCEPT
WHERE NOTED
3.5"
5"
DETAIL A:ELEVATION

Figure 8. Obscuration Meter Locations.

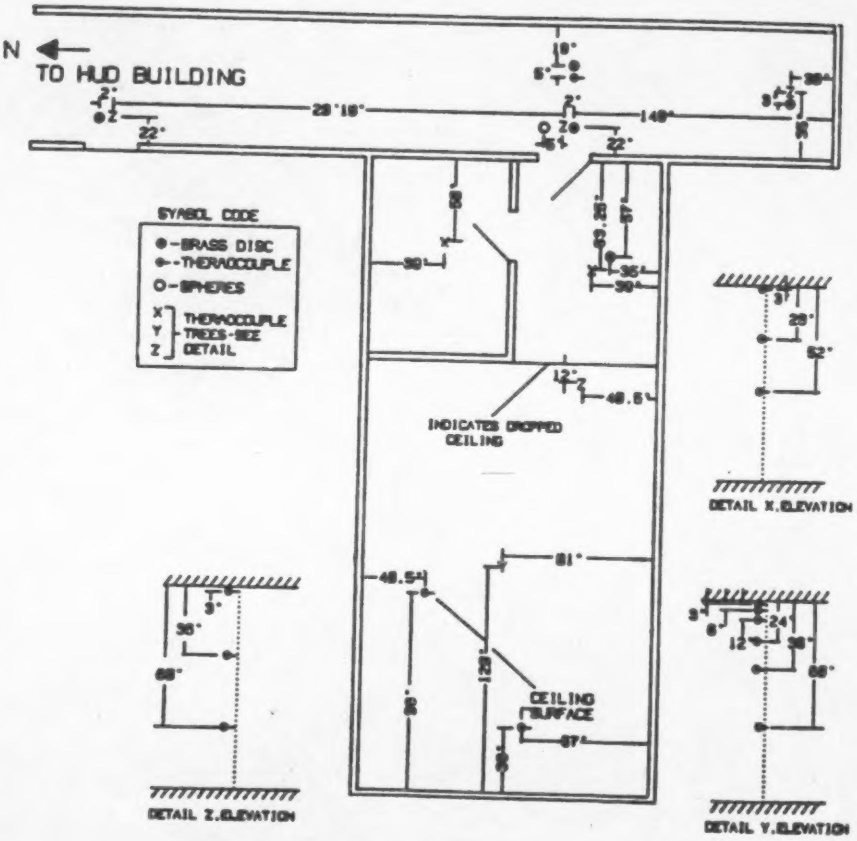
N
TO HUD BUILDING
18"
6"
2"
Z
22"
28'18"
Z
2"
148"
22"
30"
3"
Y
SYMBOL CODE
● - BRASS DISC
●- - THERMOCOUPLE
○ - SPHERES
X
Y
Z
THERMOCOUPLE
TREES-SEE
DETAIL
X
30"
Y
36"
30"
12"
Z
48.5"
INDICATES DROPPED
CEILING
3"
28"
52"
DETAIL X.ELEVATION
81"
48.5"
CEILING
SURFACE
97"
3"
36"
66"
DETAIL Z.ELEVATION
3"
6"
24"
12"
36"
66"
DETAIL Y.ELEVATION

Figure 9. Thermocouple Trees and Corridor and Foyer Thermocouples, Brass Discs, and Brass Spheres.

Disk Basys System with up to 128 data channels available. The analog signals were digitized using a 12 bit A/D converter. Signals from the chromel-alumel thermocouples were isolated and filtered at 3 Hz using a signal conditioner. Data was acquired at a rate of 1 scan each 5 seconds. The data was stored on a 10 Mb cartridge for subsequent processing on a Digital Equipment Corporation PDP 11/23 micro computer. As a visual record, video tapes of all tests were recorded. (Inadvertently, the tape of the second test was erased.)

III
TEST CONDITIONS AND PROCEDURES

In the four tests of this program, smoldering was initiated in the same manner in a bed. A commercial heater (see Section 2.2, Figures 3 and 4) was placed adjacent to sheets and one pillow. Forty-two watts were supplied to the heater for forty minutes. At this time the power to the heater was turned off. No further external heating was supplied in any of the tests.

Test conditions were varied by changing the ventilation in the guest room and hall, by opening or closing the guest room door to the corridor, and by opening or closing the door from the hotel corridor to the adjacent test facility ("the HUD Building," see Figure 1). In Test 1, no ventilation was supplied to the guest room; the guest room door to the corridor was closed; and the corridor was ventilated at a rate of 1440 cfm with air flowing freely to the adjacent test facility. The ventilation supplied corresponds to an average flow speed of 30 fpm which, as discussed in [11] is just below the limit (35 fpm) considered to cause an uncomfortable sensation of drafts. Thus, the 1440 cfm air supply represents the high range of ventilation that could be encountered in hotels. These conditions were maintained in Test 2 except that the guest room door was open. In Test 3, the guest room door was closed and ventilation was supplied to the guest room at a rate of four room changes per hour. Corridor ventilation was maintained as in Tests 1 and 2.

Ventilation in Tests 1 to 3 were the same as three of the four conditions used in the USFA hotel tests [11]. In Test 4, the guest room was unventilated and the door was open; however, the door to the HUD building was closed (to simulate a fire door) and the corridor ventilation was reduced to 200 cfm (6 air changes per hour in the corridor). This condition which is typical of many hotel installations was selected to investigate the effect of lowered corridor ventilation on obscuration, carbon monoxide concentration and detector response. Note that in all four tests, the bathroom door was ajar at a 45° angle. In Test 2, in which the guest room was ventilated, a 100 cfm exhaust fan was also used in the bathroom. A summary of test conditions is given in Table III.

In all of the tests, ventilation to the corridor and guest room was supplied from the surrounding test facility enclosing the guest room and corridor. This larger test volume was 60 ft x 40 ft x 33 ft. While fire

TABLE III
TEST CONDITIONS

Test No.	Guest Room Ventilation	Corridor Ventilation	Guest Room Door
1	None	1400 cfm	Closed
2	None	1400 cfm	Open
3	200 cfm*	1400 cfm	Closed
4	None	200 cfm	Open**

---

*Bathroom exhaust, removing 100 cfm, was employed.

**The door from the corridor connecting to the existing test facility was closed.

products flowing through the corridor were vented to the "HUD Building," fire products vented through the passive return of the guest room (see Figure 1) and the bathroom exhaust fan were vented to the surrounding enclosure. These flows were small enough that no significant smoke was visible in the larger test volume through the first five hours of testing. However in Tests 1, 3 and 4, smoke production in the guest room accelerated approximately five hours into the test and caused smoke levels to become high enough to cause irritation to observers in the larger test volume. At this time, a 4 ft x 6 ft opening in the roof of the test enclosure was opened and a ceiling fan turned on to reduce the smoke concentrations in the larger enclosure.

IV
RESULTS

4.1 OBSERVED EVENTS DURING TESTING

Self-sustained smoldering was observed in each of the four tests after the external heat source was disconnected. The propagation of the smoldering combustion, as indicated by discoloration and deformation of the bedding, appeared to be remarkably similar from test to test. Typically smoke was generated by the cartridge heater 8 min into the test. By the time that the power to the heater was disconnected at 40 min into the test, the pillow cover and sheet adjacent to the heater was blackened in an area approximately 6 in. along the length of the pillow and approximately 3 in. high. One hour into the test, an area approximately 1 ft in diameter, centered on the heater, appeared to be discolored. By 2 hours into the test, the smoldering wave had propagated the entire length of the pillow adjacent to the heater. An hour later, the pillow adjacent to the heater appeared to be consumed by the smoldering process and discoloration was evident over one-third of the other pillow. At 4 hours into the test, the smoldering wave had propagated about half way down the left side of the mattress (side near the heater, see Figure 3) and the pillow on the right was discolored over approximately two-thirds of its surface. The region of smoldering had the appearance of a quadrant of a circle. At 4-1/2 hours into the test, the smoldering combustion wave had propagated three-fourths of the way across the top of the mattress. Five hours into the test, the combustion wave had propagated almost the entire length of the top of the mattress and two-thirds down the left side of the bed. At this time production of smoke began to accelerate. Only in Test 3, however, did transition to flaming occur. By the sixth hour, the bed became totally obscured by smoke except in Test 2, where the guest room door was open and the corridor vented into the HUD Building. All tests were aborted after six hours, except for Test 3, in which sprinkler actuation occurred. At this time, no further acceleration of smoke production was visible. At the end of all tests, inspection of the mattress revealed that the entire mattress was charred.

Carbon monoxide concentration and obscuration levels in the guest room and corridor varied significantly from test to test. These differences appear to be primarily attributable to the different ventilation conditions. These results, along with detector and sprinkler response times, will be presented in the following sections and analyzed in terms of life safety.

A variable that was not controlled in the tests was the humidity in the test facility. The relative humidity varied from 40% to 100% (raining). Transition to flaming occurred in Test 3 in which the humidity was relatively low (~40%). In the other three tests, the relative humidity was greater than 60%. It is not clear whether transition to flaming in Test 3 is primarily attributable to ventilation in the guest room or the drier conditions.

4.2 TEST 1: UNVENTILATED, CLOSED GUEST ROOM (HIGH CORRIDOR VENTILATION)

Test 1 occurred under conditions of approximately 60% relative humidity. Figure 10 indicates carbon monoxide concentration in the corridor and in the guest room at three locations: at the center of the guest room ceiling, at the 5 ft level in the center of the guest room, and at the 5 ft level in the center of the foyer (see Figure 7). A steady increase in carbon monoxide concentration was observable throughout the test, with the level in the center of the guest room at the 5 ft elevation initially lagging both the concentration at the ceiling or the concentration level in the foyer. Presumably, air flow to the passive return (see Figure 1) causes the lower concentration in the center of the guest room. Approximately 5 hours into the tests, concentration began to increase rapidly. This was associated with an increase in visible smoke production. The peak values of 5000 ppm are associated with the maximum meter reading.

The time integrated value of carbon monoxide concentration exceeded the life safety limit of 43,000 ppm-min at both the guest room and foyer 5 ft location. This limit was achieved at 2 hours 54 min and 2 hours 23 min, respectively. At 2 hours 23 min the temperature and carbon monoxide concentrations at the 5 ft level in the foyer were 86°F and 880 ppm. The total time integrated concentration for the 6 hr test were, respectively, 375,190 and 436,720 ppm-min. These levels are well above our estimated lethal limit (240,000 ppm-min). Carbon monoxide in the corridor never exceeded 56 ppm, as a result of the closed guest room door and corridor ventilation.

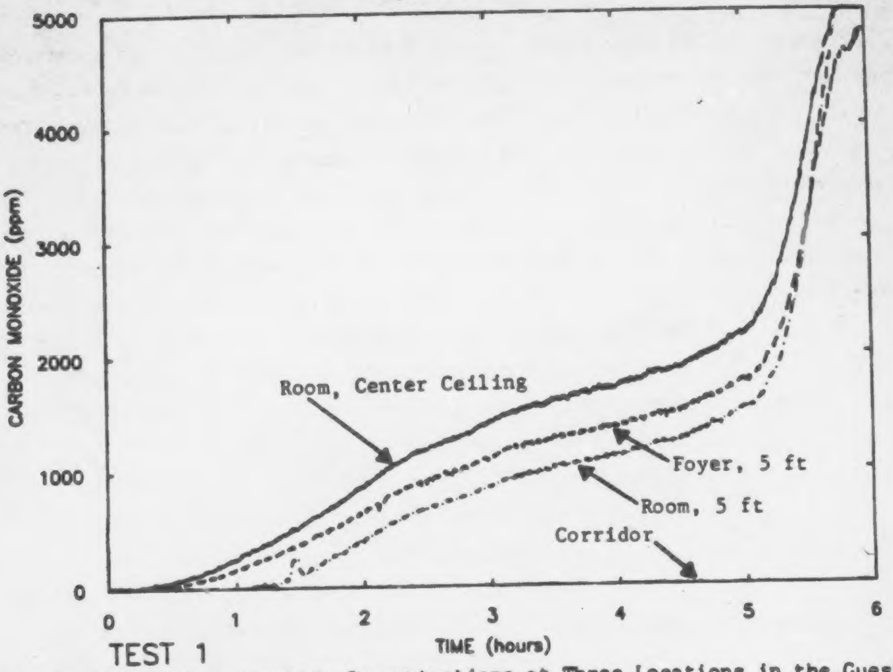

Figure 10. Carbon Monoxide Concentrations at Three Locations in the Guest Room and in the Corridor, Test 1.

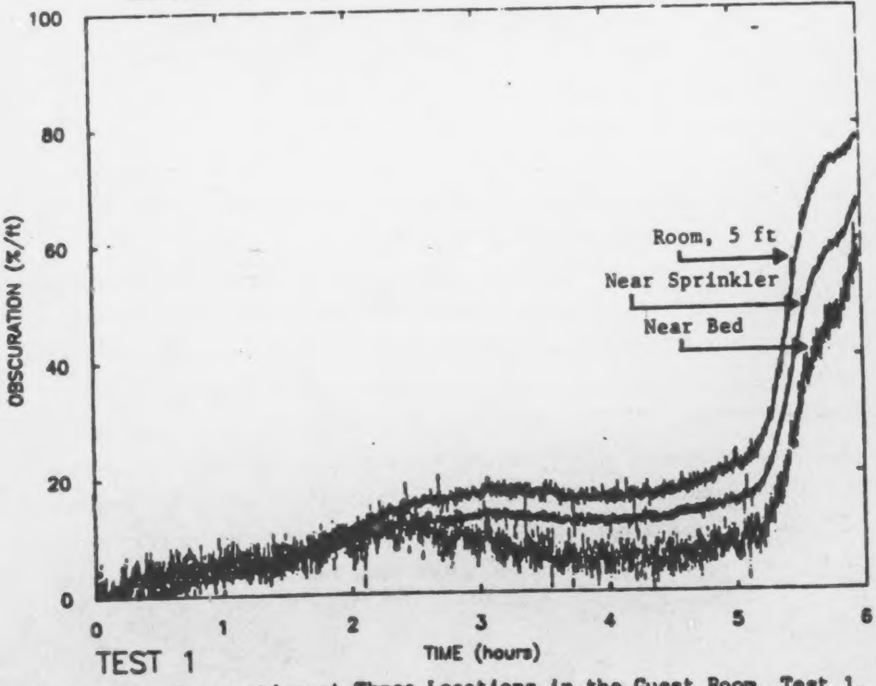

Figure 11. Obscuration at Three Locations in the Guest Room, Test 1.

The minimum oxygen concentration level measured at the 5 ft level in the center of the room was 19.1%. Gas analysis results for oxygen and carbon dioxide are given in Appendices A and B.

Obscuration measured over a pathlength of 1 ft at three locations in the guest room is shown in Figure 11. Two of the locations, indicated as "near bed" and "near sprinkler" are adjacent to Detectors 1 through 3 and 4 through 6, respectively (see Figure 5). The third is at the 5 ft level in the center of the guest room. Obscuration at the ceiling level in the center of the room is very similar to that observed at the 5 ft level and is not included for clarity. Obscuration increases in the test until 2-1/2 hours into the test. At that time, obscuration becomes approximately constant at a given location, despite the continued increase of carbon monoxide. Perhaps obscuration at this time is affected by stratification of smoke products. Acceleration of smoke production, similar to production of carbon monoxide seen in Figure 10, is clearly visible 5 hours into the test. By 6 hours, nothing was visible in the guest room to observers viewing the test through a glass window in the wall opposite the bed. In contrast, the corridor was virtually free of smoke. Since transition to flaming did not occur in Test 1, no large temperature rise occurred within the guest room. The ambient temperature at the beginning of the test was 79°F; at the end of the test the temperature had risen to 116°F.

The response times for smoke detectors and the sensitivities of the detectors are given in Table IV for Test 1. As in all tests in this study, no important systematic differences in response time based on detection location or type were observed. Differences between detector responses due to type or location were small compared to the detector alert time (the time between detector response and the time at which tenability criteria were exceeded). All detectors in the guest room except one (No. 5) responded before power to the heater was disconnected (at 40 min). The average time of detector response before the carbon monoxide life safety limit was exceeded was 2 hours. The maximum and minimum alert time were 2.16 hours and 1.77 hours, respectively. At the time of response, obscuration in the guest room was 5%/ft or less. Clearly, an alerted mobile occupant would have no problem leaving the room and obtaining assistance in extinguishing the smoldering bed. Without such an alert, a sleeping and/or incapacitated occupant would not survive the ensuing environmental conditions.

TABLE IV

SMOKE DETECTOR RESPONSE TIMES, TEST 1

Detector No.	Smoke Detectors	Time (min)	Sensitivity (Obscuration %/ft)
		Guest Room Detectors	
1	Light Scattering A	14.67	2.95
2	Light Scattering B	13.5	3.38
3	Ionization	25.5	1.13
4	Light Scattering A	17.33	2.75
5	Light Scattering B	44.58	3.24
6	Ionization	18.67	1.21
7	Light Scattering A	25.17	3.04
8	Light Scattering B	17.67	1.02
9	Ionization	26.17	3.29
		Corridor Detectors	
10	Light Scattering A	No Response	2.75
11	Light Scattering B	No Response	3.33
12	Ionization	No Response	1.24
13	Light Scattering A	No Response	2.88
14	Light Scattering B	No Response	2.91
15	Ionization	No Response	1.20

4.3 TEST 2: UNVENTILATED, OPEN GUEST ROOM (HIGH CORRIDOR VENTILATION)

Test 2 repeated the conditions of Test 1, except the guest room door was open. (Relative humidity ranged from 100% (raining) to approximately 60% by the end of the test.) The smoldering process appeared similar to that observed in Test 1, however, as a result of the open door, carbon monoxide concentration and obscuration were significantly lower than in Test 1.

In Figure 12, carbon monoxide concentration as measured in the guest room and corridor are shown. The carbon monoxide concentration increased steadily in the room for the first two hours of the test, in a similar manner to Test 1, but at lower concentration levels. Concentrations remained approximately constant 2 to 5 hours into the test, as production of carbon monoxide by smoldering was balanced by venting through the passive return and open door. Recall in Test 1 with the door shut, the concentration levels continued to rise. Approximately 5 hours into the test, production of smoke visibly accelerated. An increase in carbon monoxide associated with this acceleration is seen in Figure 12.

The maximum concentration levels of carbon monoxide produced in the guest room in Test 2 are an order of magnitude less than in Test 1. However, the maximum concentration in the corridor, 106 ppm, is almost double that of Test 1, but still not a threat to life safety. The time integrated carbon monoxide concentration levels at the 5 ft level in the center of the room and foyer were 35,947 and 90,264. The level in the center of the room is less than the tenability limit 43,000 ppm-min; however, in the foyer the limit was exceeded 3 hours 46 min into the test. At that time the temperature and carbon monoxide level at the 5 ft level in the foyer was 92°F and 302 ppm. Assuming that the carbon monoxide concentration at 5 ft in the center of the room remained at the same level as it was 6 hrs into the test, the tenability limit would be exceeded after an additional 20 min. Thus, even with relatively low concentration levels of carbon monoxide, life threatening conditions can exist if self-sustained smoldering occurs as in these tests.

Oxygen concentration levels dropped by less than 0.2% in Test 2, and the maximum carbon dioxide level measured was only 0.16%. Gas analysis results are shown for Test 2 in Appendices A and B. Ambient temperature at the beginning of the test was 85°F. At the end of the test, the gas temperature at the 5 ft level in the center of the room had only risen by 11°F.

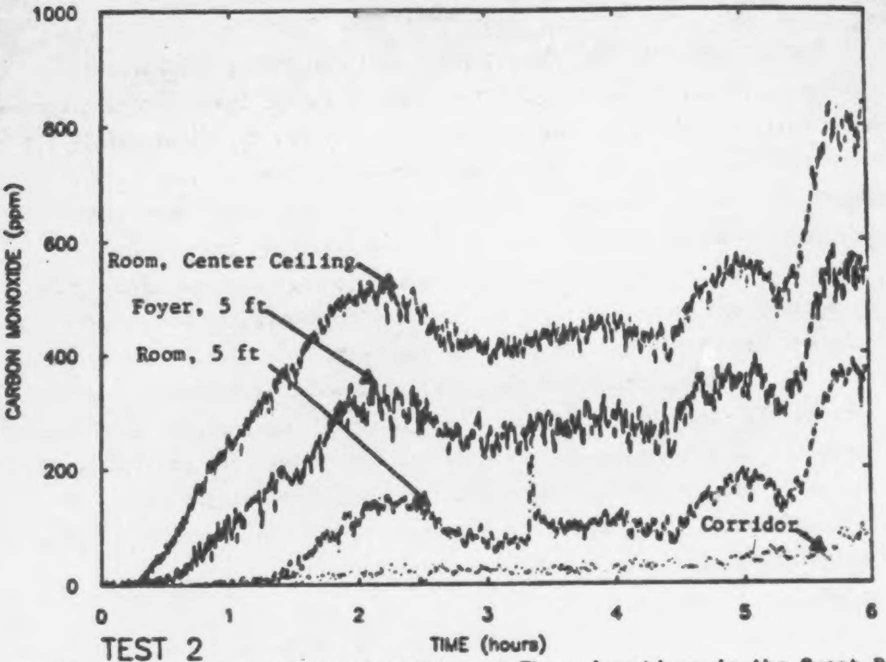

Figure 12. Carbon Monoxide Concentration at Three Locations in the Guest Room and in the Corridor, Test 2.

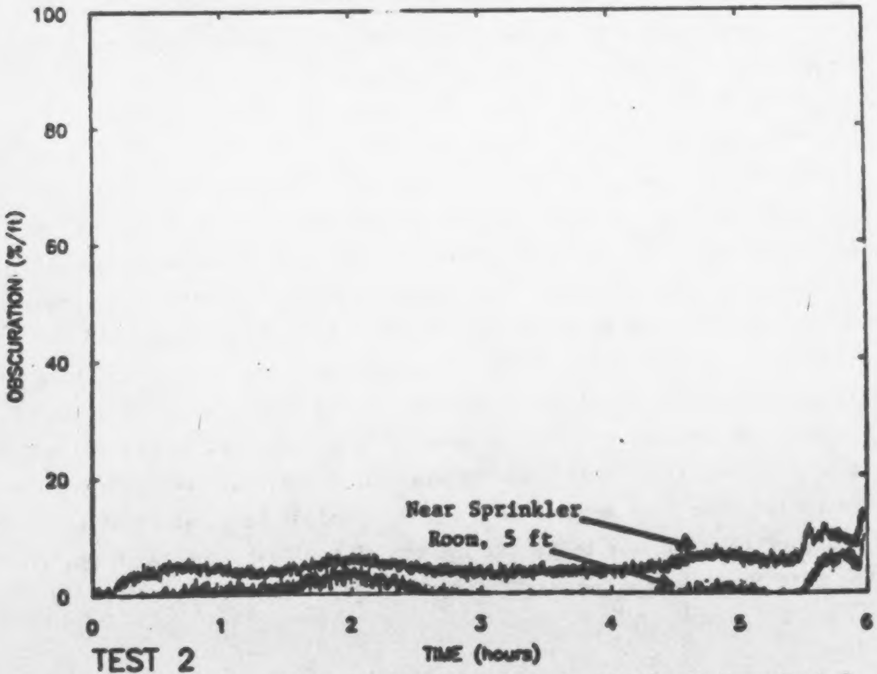

Figure 13. Obscuration at Two Locations in the Guest Room, Test 2.

Obscuration at the center of the room near the ceiling and at the 5 ft level are shown in Figure 13. Obscuration is never greater than 10%/ft until smoke production increases approximately 5-1/2 hours into the test. Typically obscuration near the ceiling is 5%/ft, while obscuration at the 5 ft level is even less. Obscuration in the corridor was less than 1%/ft.

Response times of smoke detectors and their sensitivities are given in Table V. As in Test 1, all detectors in the guest room responded; no detectors in the corridor responded. The detectors in the guest room responded an average of 3 hours 18 min before the carbon monoxide life safety limit was exceeded (at 3 hours 46 min) at the 5 ft level in the foyer.

4.4 TEST 3: VENTILATED, CLOSED GUEST ROOM (HIGH CORRIDOR VENTILATION)

Ventilation was supplied to the guest room at a rate of four room changes per hour in Test 3 (see Figure 1 for the location of the room air supply). Relative humidity was approximately 40% during the test. Transition to flaming conditions occurred approximately 5 hours into the test when the ECHS sprinkler extinguished the fire.

Carbon monoxide concentration levels in the guest room are shown in Figure 14. (Due to a malfunction in the gas analyzer, carbon monoxide concentrations at the 5 ft level in the center of the room and in the foyer were not recorded prior to 4 hours 20 min into the test.) Concentration levels are intermediate to those of Tests 1 and 2 seen in Figures 10 and 12, respectively. Propagation of smoldering was visually similar in the three tests; thus, we conclude that the ventilation supplied in Test 3 with the door closed was not as effective in reducing carbon monoxide concentration levels as simply leaving the door to the corridor open.

Time integrated values of carbon monoxide were calculated for Test 3 at the 5 ft levels in the center of the room and the foyer assuming concentrations at these locations prior to 4 hours 20 min were in the same ratio to the concentration of carbon monoxide at the ceiling level as that which occurred at 4 hours 20 min. Inspection of Figures 10 and 12 and data in Figure 14 after 4 hours 20 min indicate that this is a reasonable assumption. The total time integrated value of carbon monoxide was found to be 62,047 ppm-min and 126, 786 ppm-min in the center of the room and foyer, respectively. The 43,000 ppm-min limit was exceeded in the foyer and in the center of the room at 4 hours 11 min and 5 hours 7 min into the test, respectively. At

TABLE V

SMOKE DETECTOR RESPONSE, TEST 2

Detector No.	Smoke Detectors	Time (min)	Sensitivity (Obscuration %/ft)
		Guest Room Detectors	
1	Light Scattering A	12.17	2.75
2	Light Scattering B	11.92	3.33
3	Ionization	44.58	1.14
4	Light Scattering A	18.00	2.75
5	Light Scattering B	44.83	3.34
6	Ionization	40.92	1.06
7	Light Scattering A	18.83	2.93
8	Light Scattering B	30.50	2.97
9	Ionization	30.17	1.04
		Corridor Detectors	
10	Light Scattering A	No Response	2.75
11	Light Scattering B	No Response	3.33
12	Ionization	No Response	1.24
13	Light Scattering A	No Response	2.88
14	Light Scattering B	No Response	2.91
15	Ionization	No Response	1.20

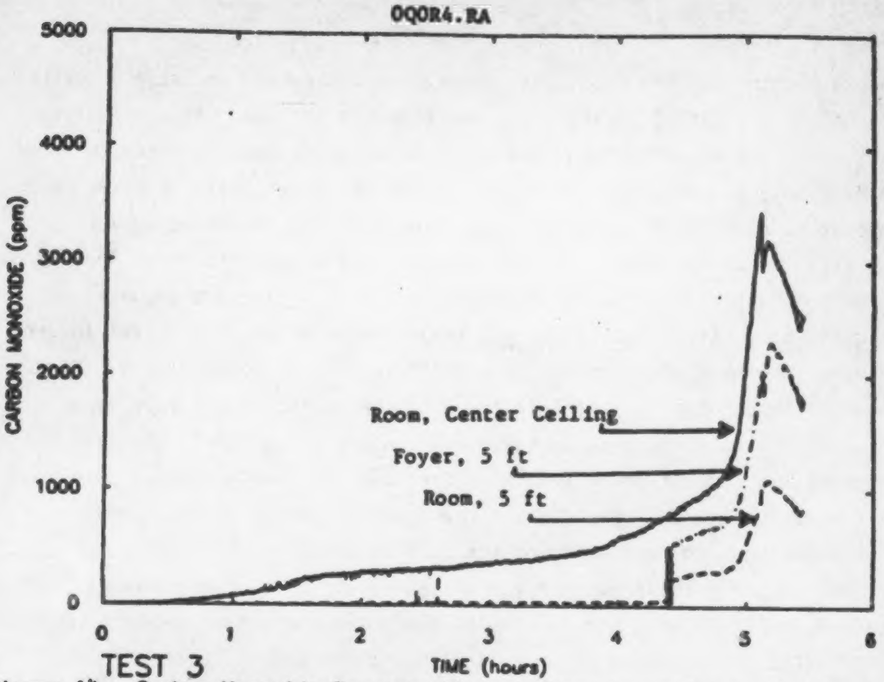

Figure 14. Carbon Monoxide Concentration at Three Locations in the Guest Room, Test 3 (Note Malfunction in Analyzer for 5 ft Locations Prior to 4 hr 20 min).

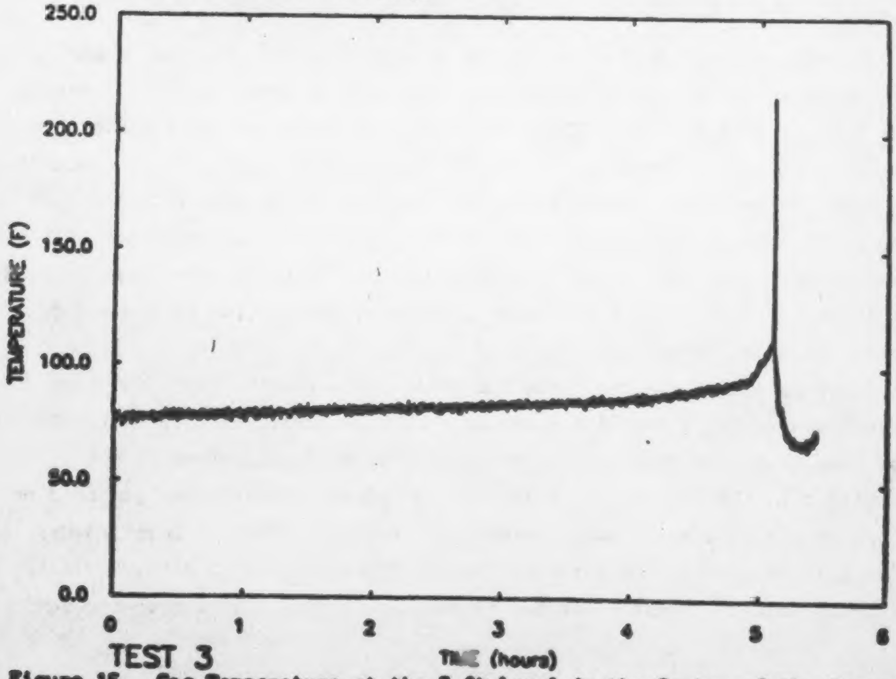

Figure 15. Gas Temperature at the 5 ft Level in the Center of the Room, Test 3.

4 hours 20 min into the test, the temperature and carbon monoxide concentration at the 5 ft level in the foyer was 88°F and 572 ppm. As in previous tests, accelerated production of visible smoke and carbon monoxide occurred approximately 5 hours into the test. Unlike the other tests, however, a sharp temperature rise in the room was associated with the increased smoke production. Gas temperature at the same elevation and 4 in. from the sprinkler reached 288°F before the ECHS and foyer sprinklers actuated at 5 hours 7 min. At that time the gas temperatures at the 5 ft level in the center of the room and corridor were 217°F and 170°F, respectively. Figure 15 shows gas temperature at the 5 ft level in the center of the room as a function of time. The peak in temperature 5 hours 8 min into the test clearly indicates the transition to flaming. Sprinkler actuation at this time caused the temperature to fall rapidly. A reduction in carbon monoxide then accompanied the extinguishment of the fire (see Figure 14).

The carbon dioxide and oxygen concentration levels were also intermediate to Tests 1 and 2. The maximum carbon dioxide concentration was 0.68%. (Full results are given in Appendix A and B.)

Obscuration is reported in Figure 16 near the ECHS sprinkler, at the 5 ft level in the center of the room, and at the ceiling level at the end of the corridor (see Figure 8).

The results are again intermediate to Tests 1 and 2 (Figures 11 and 13). Obscuration is less than 10%/ft at the ceiling level near the sprinkler until 4 hours into the test. Similar results were observed at the other two ceiling locations in the guest room. No significant obscuration occurs at the 5 ft level in the guest room until after 4 hours. Five hours into the test, obscuration at the 5 ft level in the center of the room and near the ECHS sprinkler is approximately 80%/ft. Obscuration in the corridor is still less than 5%/ft. At the time of sprinkler actuation, obscuration at the end of the corridor peaks at 10/%/ft.

Smoke detector response times and sprinkler actuation times for Test 3 are reported in Table VI. All smoke detectors responded in this test. The guest room detectors responded on average 3 hours 42 min before it was estimated that the life safety criterion for carbon monoxide was exceeded or 4 hours 37 min before sprinkler actuation. Although detector location was, as in the previous tests, not critical from a life safety point of view, it is noteworthy that the first detectors to respond in Test 3 were near the ECHS

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TABLE VI

SMOKE DETECTOR AND SPRINKLER RESPONSE TIMES, TEST 3

Detector No.	Smoke Detectors	Time (min)	Sensitivity (Obscuration %/ft)
		Guest Room Detectors	
1	Light Scattering A	20.08	3.36
2	Light Scattering B	20.42	3.05
3	Ionization	18.75	0.99
4	Light Scattering A	15.25	2.77
5	Light Scattering B	15.50	3.32
6	Ionization	13.92	1.11
7	Light Scattering A	58.92	3.18
8	Light Scattering B	80.67	3.00
9	Ionization	19.67	1.06
		Corridor Detectors	
10	Light Scattering A	302.08	2.75
11	Light Scattering B	300.08	3.33
12	Ionization	306.58	1.24
13	Light Scattering A	302.00	2.88
14	Light Scattering B	302.00	2.91
15	Ionization	305.67	1.20
	Sprinklers		
16	Sidewall	306.58	-
17	Entry	306.58	-
18	Bathroom	-	-

sprinkler rather than near the bed. Recall in Tests 1 and 2, the first detectors to respond were near the bed. Apparently in this test, the smoke was convected towards the foyer and detectors near the sprinkler by room currents induced by the ventilation system before smoke could rise by buoyancy to the detectors near the bed.

In contrast to Tests 1 and 2, all corridor detectors responded in Test 3. Comparing Figure 11 and Figure 16 which indicate obscuration in the guest room for Tests 1 and 3, respectively, it is clear that high levels of obscuration in the guest room are not sufficient to cause corridor detectors to respond with the guest room door closed. In Test 3 at 5 hours time, obscuration has reached a level of 80%/ft in the guest room without corridor detectors responding. An increase in the rate of temperature rise at this time as seen in Figure 15, also suggests that the combustion processes is intensifying. One light-scattering detector in the corridor (No. 11) responded 5 sec later. The rest of the corridor detectors responded within another 6.5 min. Figure 15 indicates that transition to flaming and sprinkler actuation also occurred at this time. Thus smoke was apparently transported into the corridor as the result of room pressurization accompanying the transition to flaming combustion.

No carbon monoxide measurements are available in the corridor for Test 3; however, the low obscuration levels reported in Figure 16 in the corridor along with our experience from previous tests [11] suggested that the corridor remained tenable. The corridor detectors thus would have provided a means of alerting other occupants of the need to evacuate. Unfortunately, neither the corridor detectors or the sprinklers responded before the carbon monoxide life safety criterion was exceeded in the guest room.

4.5 TEST 4: UNVENTILATED, OPEN GUEST ROOM (NORMAL CORRIDOR VENTILATION)

In Test 4, a different ventilation condition in the corridor was investigated. The ventilation in the corridor was reduced to 200 cfm (6 air changes in the corridor per hour) and the door from the corridor to the HUD Building (Figure 1) was closed to simulate a fire door at that location. Venting out of the corridor was achieved only from leakage. (The relative humidity during the test was approximately 60%.)

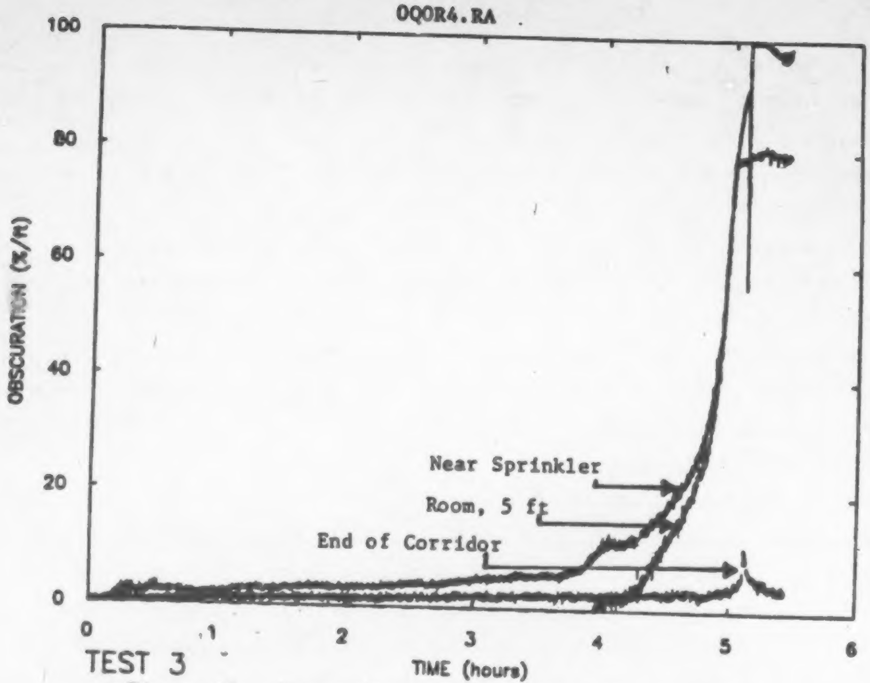

Figure 16. Obscuration at Three Locations, Test 3.

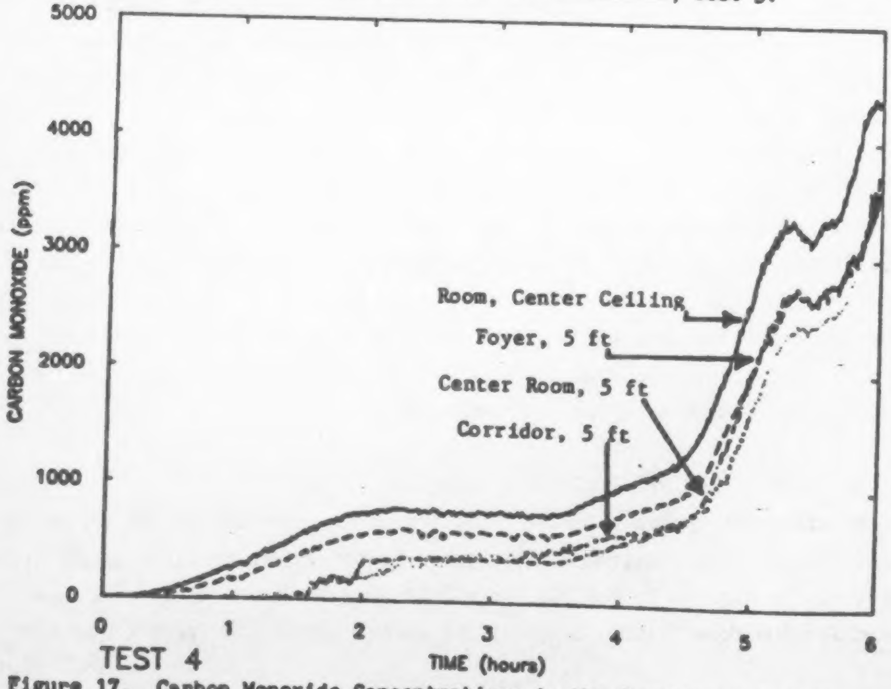

Figure 17. Carbon Monoxide Concentrations in the Corridor and at Three Locations in the Guest Room, Test 4.

Results in the guest room (Figure 17) were similar to those of Test 1, except that the buildup of carbon monoxide was somewhat slower and the maximum levels of carbon monoxide achieved were less. However, lowering the ventilation in the corridor and blocking the flow of air to the HUD Building significantly affected carbon monoxide and obscuration levels. Carbon monoxide levels in the corridor were approximately the same as those at the 5 ft level in the middle of the guest room. The carbon monoxide life safety criterion was exceeded after 2 hours 30 min at the 5 ft level in the foyer. At that time the temperature and carbon monoxide concentration at the 5 ft level in the foyer was 85°F and 592 ppm. The total time integrated value of carbon monoxide in the foyer and center of the room were respectively, 328,379 and 267,710. Both values are above the lethal limit.

Obscuration results in the guest room are shown in Figure 18. Results are similar to those of Tests 1 and 3. Results from the corridor are shown in Figure 19. Substantial build-up of smoke is evident. Between 2 and 4 hours into the test, changes in carbon monoxide concentration and obscuration levels are small. Between 4 and 5 hours into the test, smoldering intensified. This is evident in Figure 20 in the rise in the gas temperature at the 5 ft level in the center of the room. Figures 17 through 19 give similar indications of combustion intensification. Six hours into the test, the gas temperature near the sprinkler had reached 141°F. An additional rise of 22°F was required for sprinkler actuation; the test was aborted since smoke production did not appear to be accelerating (Figure 19).

Smoke detector response times are listed in Table VII. All detectors responded. Guest room detectors responded an average of 1 hour 43 min before the life safety criterion for carbon monoxide was exceeded. Only two corridor detectors responded prior to this time. However, all of the corridor detectors responded before the carbon monoxide concentration was greater than 570 ppm. Moreover, obscuration within the corridor was typically less than 10%/ft at the time that detectors responded.

4.6 RESPONSE OF THE PROJECTED BEAM DETECTOR

An alternate system to smoke detectors in the corridor is the projected beam detector. The location of the beam detector in the corridor is shown in Figure 5. In Figures 21 and 22, the signal from the beam detector is presented for the four tests. Drift in the output during the first 2 hours of

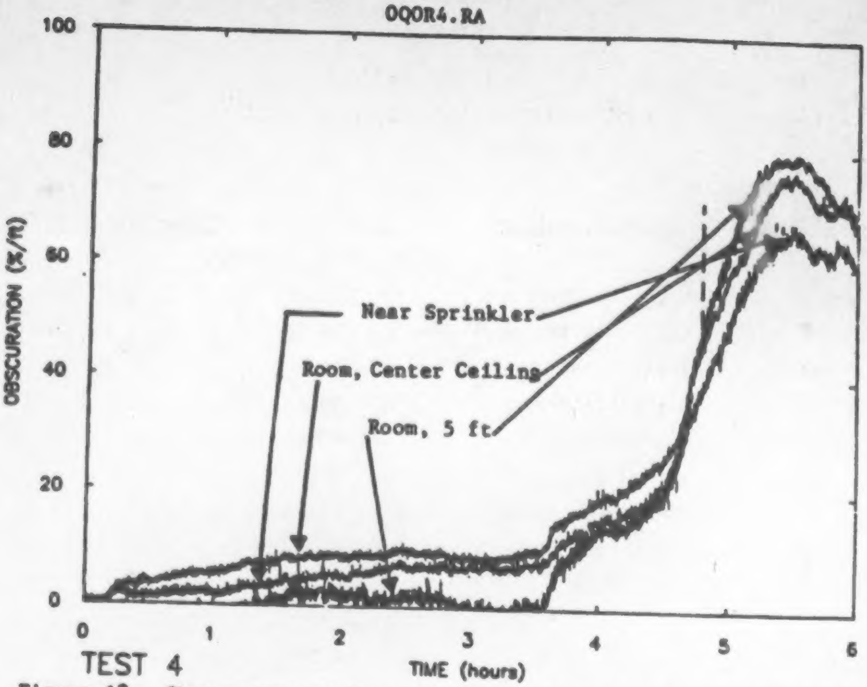

Figure 18. Obscuration at Three Locations in the Guest Room, Test 4.

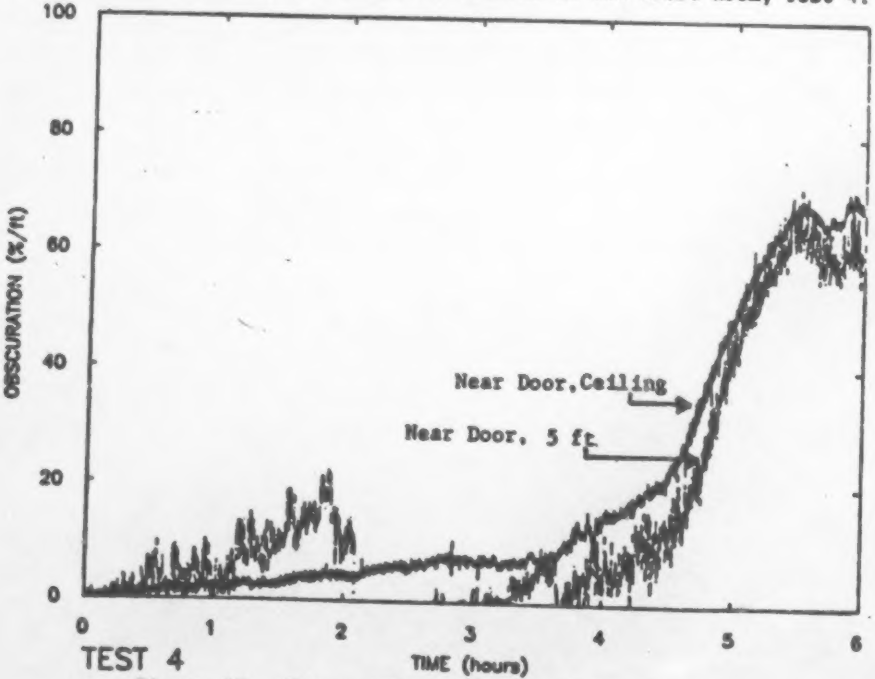

Figure 19. Obscuration in the Corridor, Test 4.

TABLE VII
SMOKE DETECTOR RESPONSE TIMES, TEST 4

Detector No.	Smoke Detectors	Time (min)	Sensitivity (Obscuration %/ft)
		Guest Room Detectors	
1	Light Scattering A	12.33	3.09
2	Light Scattering B	20.92	3.21
3	Ionization	34.92	1.25
4	Light Scattering A	15.42	2.95
5	Light Scattering B	67.25	2.76
6	Ionization	121.42	1.23
7	Light Scattering A	19.58	3.06
8	Light Scattering B	24.58	3.27
9	Ionization	92.83	1.20
		Corridor Detectors	
10	Light Scattering A	105.42	2.75
11	Light Scattering B	101.50	3.33
12	Ionization	232.25	1.24
13	Light Scattering A	164.25	2.88
14	Light Scattering B	172.58	2.91
15	Ionization	220.25	1.20

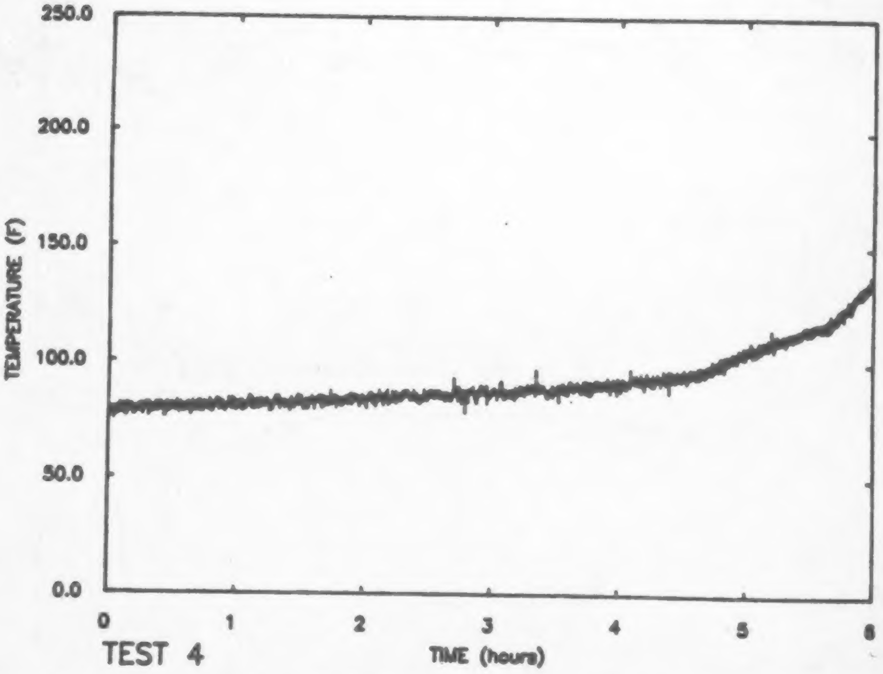

Figure 20. Gas Temperature at the 5 ft Level in the Center of the Room.

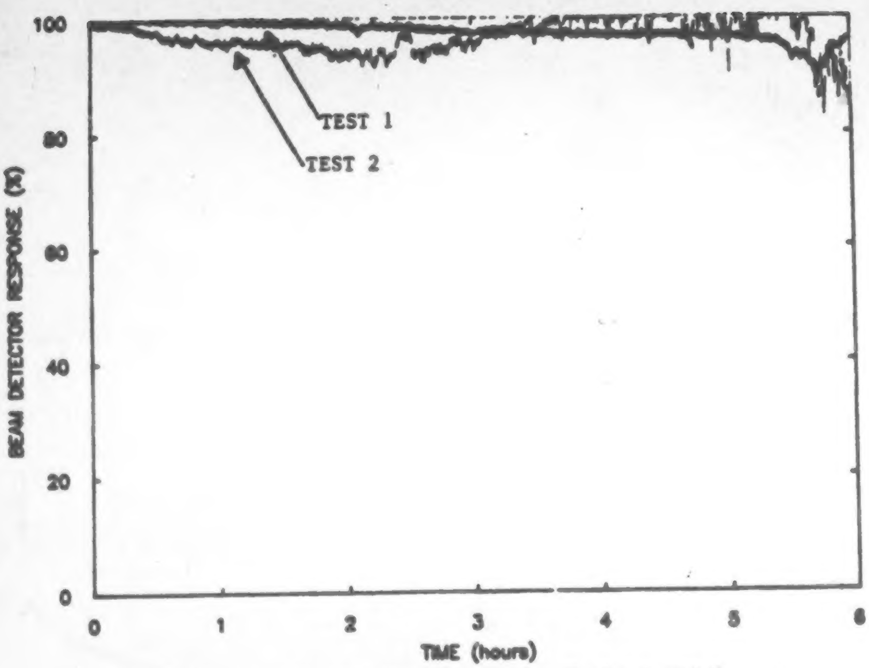

Figure 21. Projected Beam Output for Tests 1 and 2.

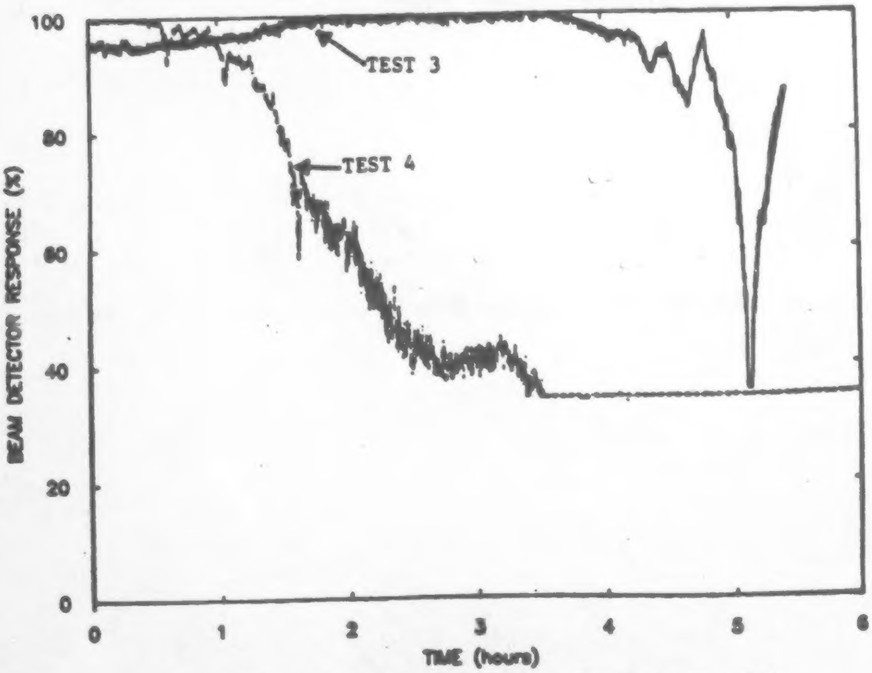

Figure 22. Projected Beam Output for Tests 3 and 4.

Test 3 is seen in Figure 22. The signal is normalized in terms of the full scale voltage (-3.6 V). The normalized output is approximately equal to the light transmission down to 35%. At this level saturation in the instrument's electronics occurs. Assuming a 15% change in voltage is sufficient to provide an accurate response signal, then the projected beam detector did not respond in Test 1. Response in Tests 2 through 4 occurred at 5 hr 40 min, 4 hr 39 min and 1 hr 22 min. In Test 4, in which the door was open and ventilation in the corridor was reduced to 6 air changes per hour, the beam detector provided an advance warning 2 hr 18 min before the room and corridor became untenable. In Tests 2 and 3, although the beam detector responded after the room became untenable, it is significant that a response occurred even though the corridor remained tenable. Furthermore in Test 3, the beam detector responsed 28 min before sprinkler actuation.

4.7 KEY RESULTS FOR TESTS

The key results for Tests 1 through 4 are summarized in Table VIII. These are: 1) detector and sprinkler response times, 2) times to exceed the 43,000 ppm-min limit for CO at three locations (tenability time), 3) total time integrated CO for two locations ($\int CO^{dt}$), 4) maximum gas temperature at two locations, and 5) maximum CO at three locations.

Note that the total time of integration for the integrated carbon monoxide results is given in brackets. The ventilation conditions for each test are given in Table III.

TABLE VIII

KEY RESULTS: TESTS 1 THROUGH 4

Results	Test 1	Test 2	Test 3	Test 4
Guest Room Detector Response (min)	15-45	12-46	14-81	12-93
Corridor Detector Response (min)	No Response	No Response	300-307	101-232
Projected Beam Response (min)†	No Response	340	279	82
ECHS Sprinkler Actuation Time (min)	No Response	No Response	307	No Response
Room Center** (5 ft) Tenability Time (min)	174	Tenability Limit Not Exceeded	300††	228
Foyer** (5 ft) Tenability Time (min)	143	226	250††	150
Corridor (5** ft) Tenability Time (min)	Tenability Limit Not Exceeded	Tenability Limit Not Exceeded	Tenability Limit Not Exceeded	221
$\int CO\,dt$ (ppm-min) [integration period] Room Center (5 ft)	375,000 [6 hr]	35,900 [6 hr]	62,000†† [5.4 hr]	268,000 [6 hrs]
$\int CO\,dt$ (ppm-min) [integration period] Foyer (5 ft)	437,000 [6 hr]	90,300 [6 hr]	127,000†† [5.4 hr]	328,000 [6 hrs]

TABLE VIII
KEY RESULTS TESTS 1 THROUGH 4
(continued)

Results	Test 1	Test 2	Test 3	Test 4
T_{max} 5 ft Room (°F)	116	96	217	139
T_{max} Near Sprinkler (°F)	116	95	288	141
CO_{max} Room (ppm)	>5000*	387	1100	3730
CO_{max} Foyer (ppm)	4820	589	2290	3610
CO_{max} Corridor (ppm)	56	106	Instrument Malfunction	3480

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*Meter off Scale.

**Time to reach 43,000 ppm-min of CO.

†Time at which output is reduced by 15%.

††Carbon monoxide concentration prior to 4 hr 20 min extrapolated from center room ceiling data.

V

CONCLUSIONS

Smoldering combustion was self-sustained in the bed mattress in all four tests. Ventilation conditions significantly affected the levels of carbon monoxide and obscuration in the guest room and corridor. Carbon monoxide levels were highest in Test 1 in which the guest room was unventilated and the door was closed. Obscuration in the guest room reached a maximum of almost 80%/ft at 5 ft in the center of the room. In this test, the guest room was unventilated and the door was closed. Simply opening the guest room door in Test 2, while maintaining corridor ventilation at 1440 cfm as in Test 1, reduced the levels of carbon monoxide by an order of magnitude, and obscuration in the guest room was reduced to less than 15%/ft. Test 3, in which the guest room door was closed but ventilation was supplied at a rate of four room changes per hour, produced concentration levels of carbon monoxide intermediate to Tests 1 and 2 in the guest room. In Tests 1 through 3, the fresh air supplied to the corridor (1440 cfm) was freely vented to an adjoining test facility. This level of ventilation was sufficient to maintain obscuration in the corridor below 10%/ft. Test 4, in which corridor ventilation was reduced to 200 cfm (6 air changes per hour in the corridor) and the door at the end of the corridor was closed, produced levels of obscuration and carbon monoxide in both the corridor and guest room comparable to the levels observed in the guest room in Test 1.

Although the levels of carbon monoxide varied appreciably from test to test, the time integrated value of carbon monoxide eventually exceeded 43,000 ppm-min at the 5 ft level in the foyer in all tests. This limit was only exceeded in the corridor in Test 4.

Transition to flaming combustion only occurred in Test 3. In this test, the transition occurred approximately 5 hours into the test. The room was ventilated, and perhaps the addition of fresh air caused the transition to occur; however, an uncontrolled test variable, relative humidity, may also have been significant. In Test 3, the relative humidity was 40%. In contrast, in the other three tests, the relative humidity varied from 60% to 100% (raining).

All guest room detectors responded in all four tests while the room was tenable with respect to carbon monoxide and gas temperature. Obscuration was typically 5%/ft or less at the time of response. The average advance warning time provided before the time integrated value of carbon monoxide exceeded 43,000 ppm-min was 2 hr 42 min. The average time in the four tests at which this condition was exceeded was 3 hr 12 min.

No corridor detectors responded in Tests 1 and 2 despite tenability limits being reached in the guest room. In Test 3, in which flaming occurred, the corridor detectors responded on average 3.5 min before the actuation of the sprinkler even though the guest room door was closed. Obscuration in the corridor was no more than 10%/ft throughout the test. In Test 4, two corridor detectors responded before the carbon monoxide limit of 43,000 ppm-min had been exceeded in the guest room. The remaining four corridor detectors responded while obscuration was less than 10%/ft. The projected beam detector in the corridor responded in three of the four tests. In Tests 2 and 3, response occurred even though tenability limits were not exceeded in the corridor. In Test 4, the beam detector responded 39 min before the corridor became untenable.

In Test 3, in which transition to flaming occurred, two sprinklers actuated: the extended coverage sidewall sprinkler equipped with a fast response link and the pendent, fast response sprinkler in the foyer. The fire was extinguished in the mattress before any furnishings beside the bed were involved. At the time of actuation, however, tenability limits for carbon monoxide were exceeded and obscuration in the guest room was greater than 80%/ft. Sprinkler actuation did not occur in any other test.

VI
RECOMMENDATIONS

The series of four smoldering tests has shown that tenability conditions can be exceeded in guest rooms when self-sustained smoldering occurs in institutional furnishings. The average advance warning time of 2.7 hours provided by guest room detectors would be more than adequate to allow occupants to leave the guest room or allow for assistance to incapacitated occupants. It is important to note that untenable conditions were created prior to transition to flaming conditions in one test and without flaming in three other tests. Based on these results, it is recommended that smoke detectors be placed in all guest rooms.

In the single test in which flaming occurred, the fire was extinguished by the sidewall sprinkler as in the previous USFA hotel tests [11]. The importance of extinguishing the fire in the room of origin can not be underestimated. Although tenability limits were exceeded before sprinkler actuation, extinguishment of the fire greatly enhances the safety of occupants of other rooms. We note also that in the previous USFA hotel tests [11], tenability limits in flaming-started fires were maintained by the extended coverage sidewall sprinklers equipped with fast-response links. Thus we also recommend that guest rooms and corridors be fully sprinklered.

The performance of corridor detectors in regard to guest room fires appears to be strongly affected by ventilation conditions. In the lowest corridor ventilation condition of this study (6 air changes per hour), corridor detectors would provide significant alert to occupants. In regard to fires outside of guest rooms, which were not part of this study, we feel that corridor detectors should provide response typical of the guest room detectors used in this study. Corridor smoke detectors are therefore similarly recommended. The projected beam detector also provided useful warnings to occupants outside the room of fire origin and should be considered for use in corridors and other open areas.

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APPENDIX A

CARBON DIOXIDE CONCENTRATIONS, TESTS 1 THROUGH 4

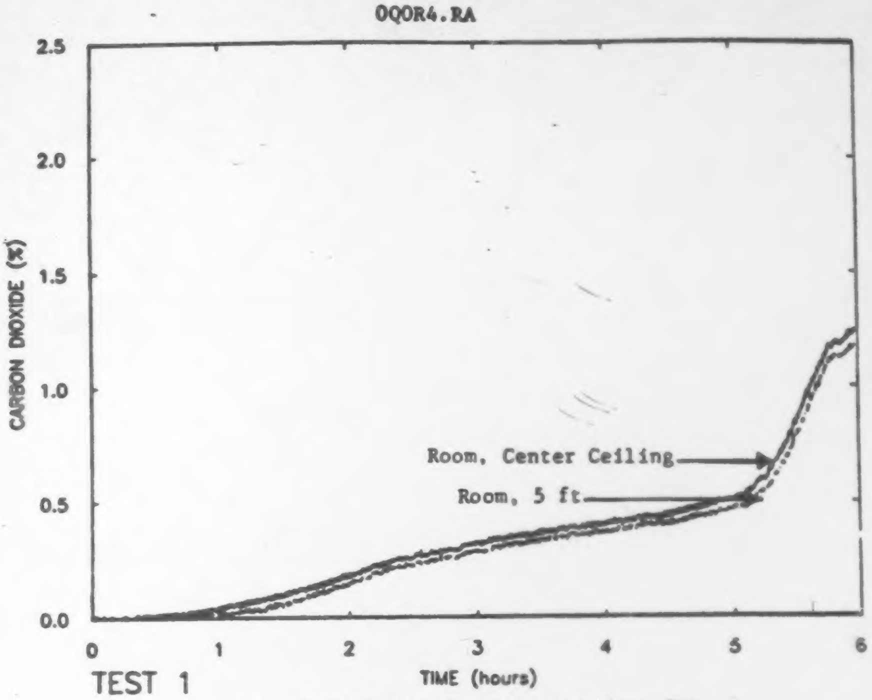


Figure A.1. Carbon Dioxide Concentration, Test 1.

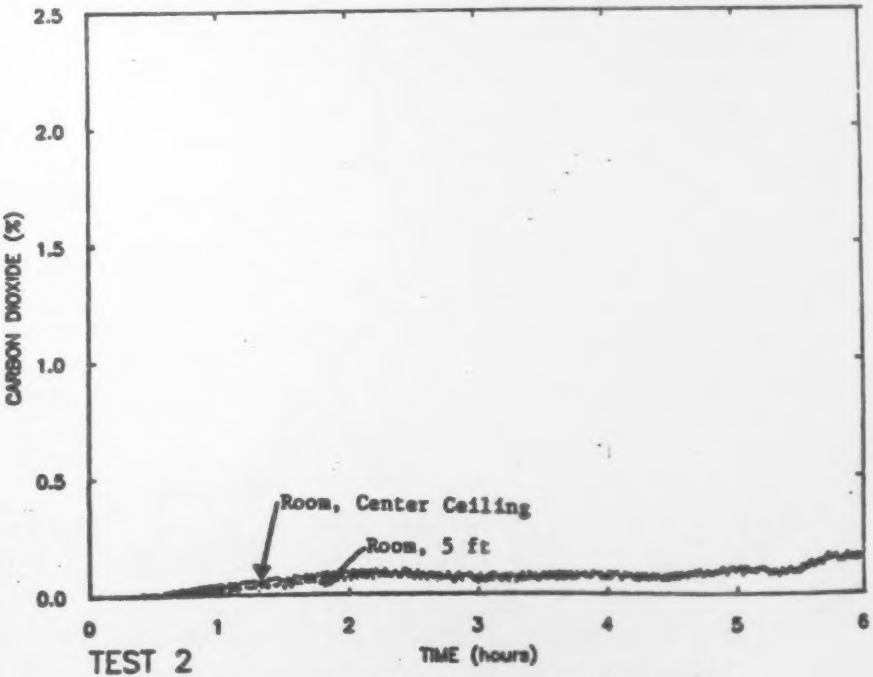


Figure A.2. Carbon Dioxide Concentration, Test 2.

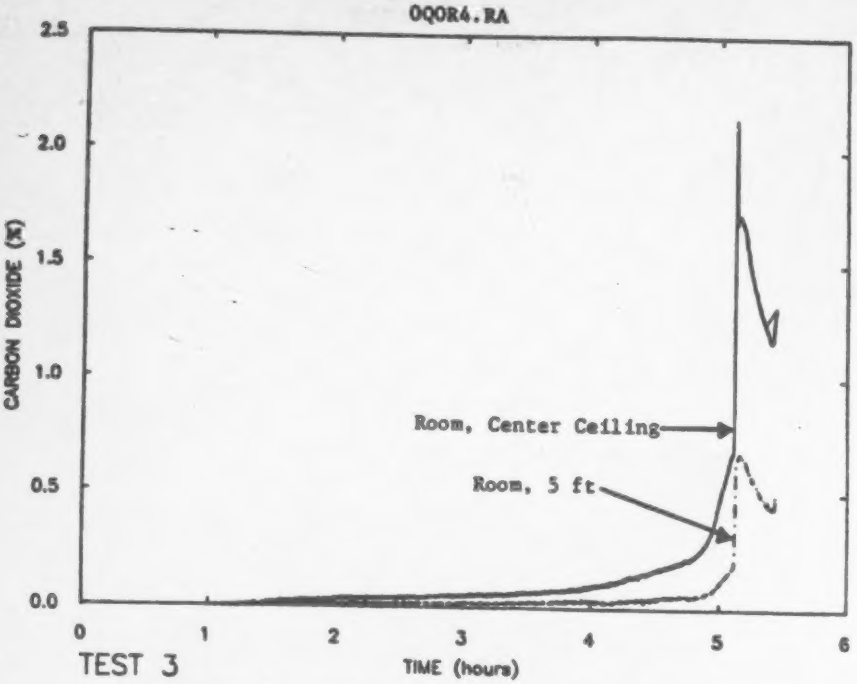
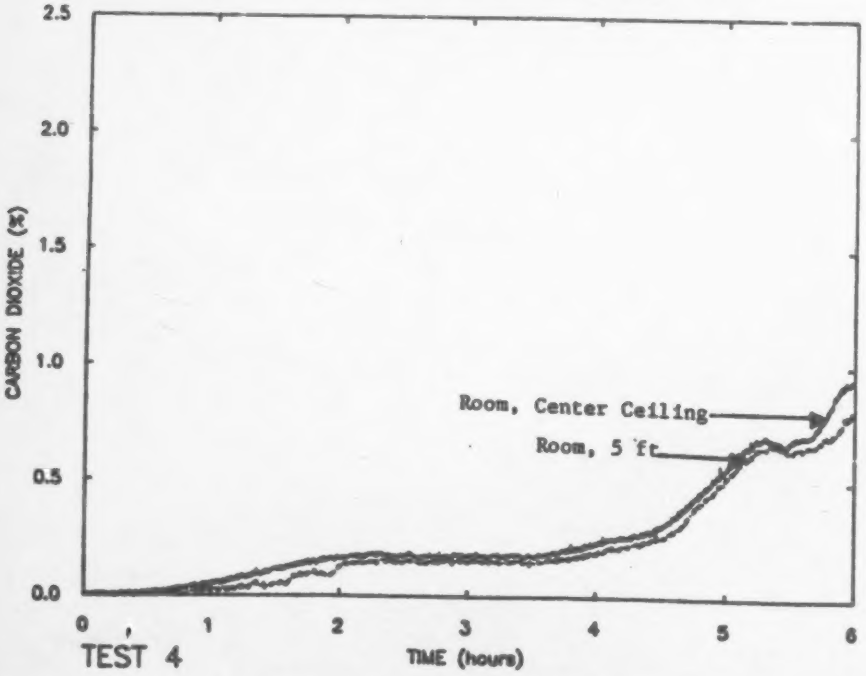


Figure A.3. Carbon Dioxide Concentration, Test 3.

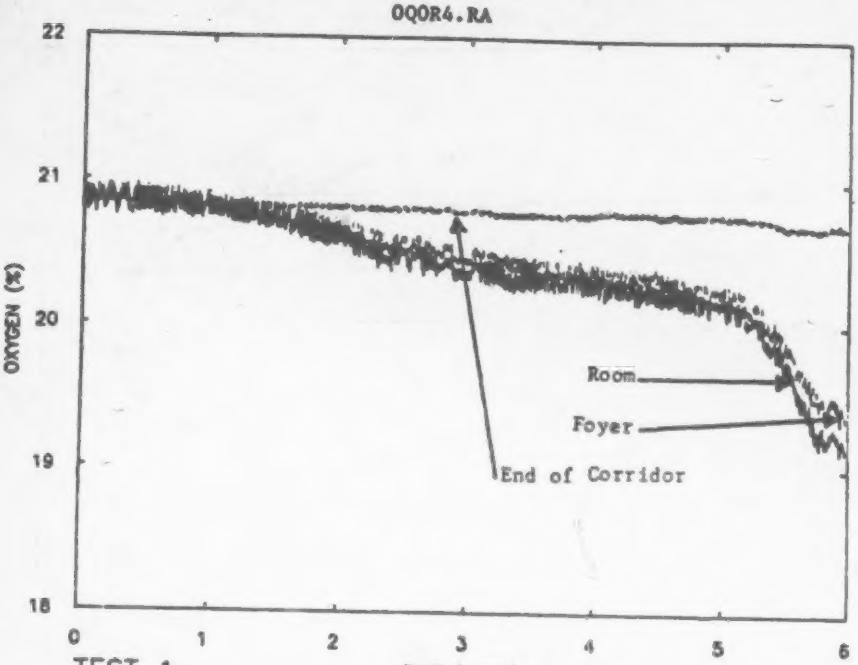


A.4 Carbon Dioxide Concentration, Test 4.

APPENDIX B

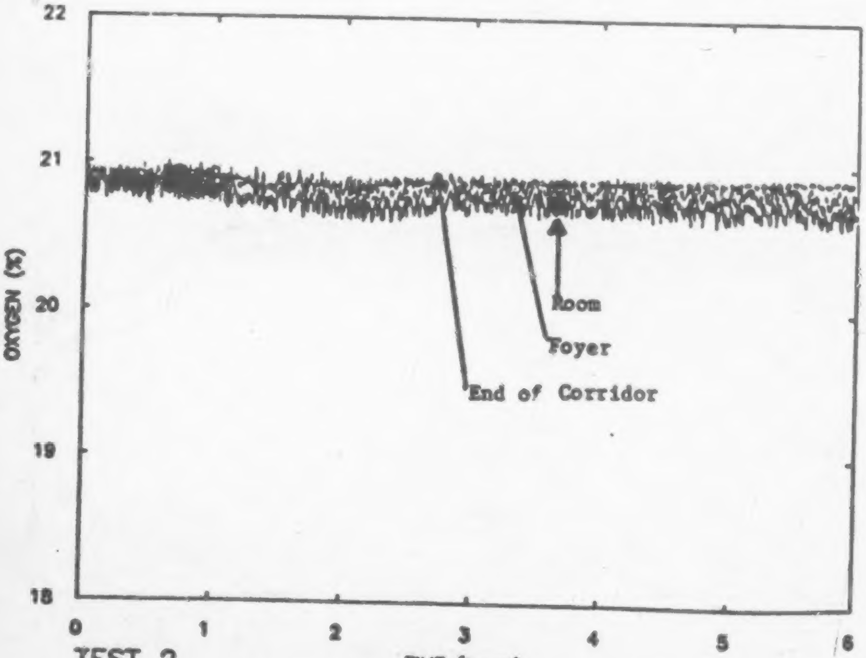
OXYGEN CONCENTRATIONS, TESTS 1 THROUGH 4

OQOR4.RA



TEST 1

Figure B.1. Oxygen Concentrations at the 5 ft Level, Test 1.



TEST 2

Figure B.2. Oxygen Concentrations at the 5 ft Level, Test 2.

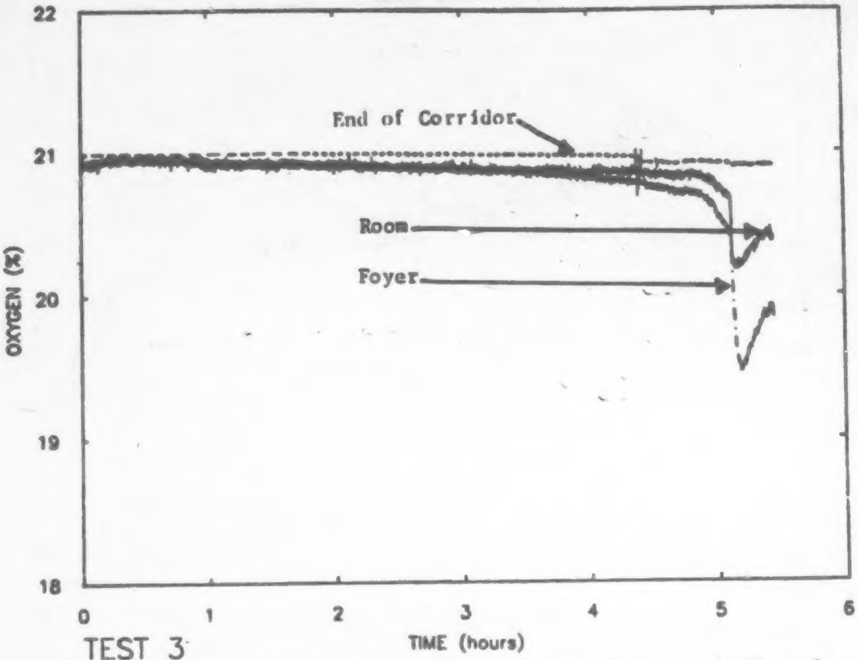
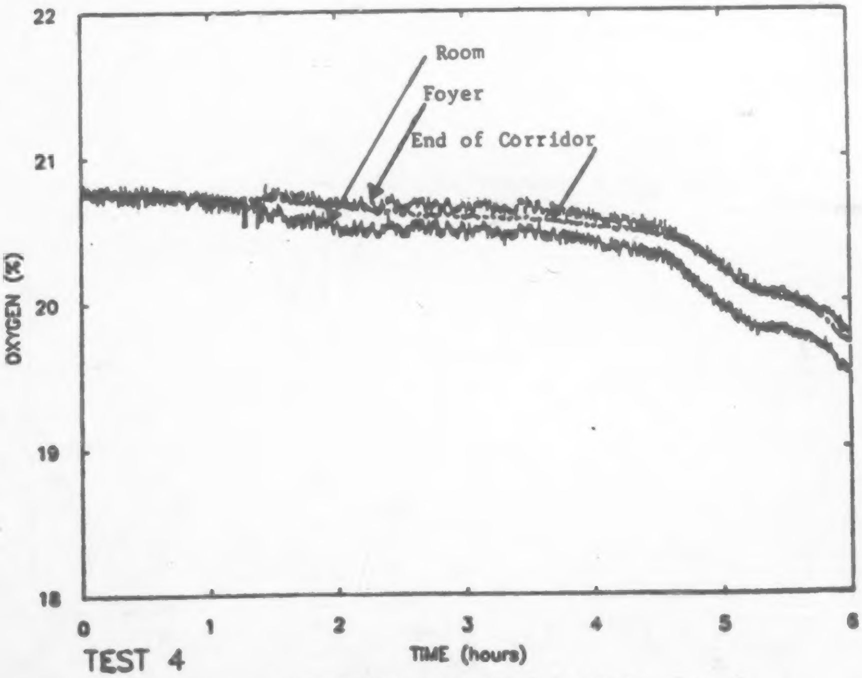


Figure B.3. Oxygen Concentrations at the 5 ft Level, Test 3.



B.4 Oxygen Concentration at the 5 ft Level, Test 4.

APPENDIX C

VENTILATION THROUGH THE PASSIVE RETURN, TESTS 1 THROUGH 4

Ventilation through the passive return (Figure 1) was monitored in all four tests by placing a bi-directional probe within the 8 in. diameter vertical duct above the return (see Figure 2). The probe was placed five diameters downstream of a 4 in. orifice plate used for mixing. Flow rates through the duct are shown in Figures C.1 through C.4 for Tests 1 through 4. A summary of test conditions is given in Table III. In Tests 1 and 3 (Figures C1 and C.3) in which the guest room door was shut, an increase in flow rate with time was observable. The increase in Test 1 was associated with an intensification in the combustion process (see Figure 11). Recall that in Test 3, transition to flaming combustion and sprinkler actuation occurred at 5 hr 7 min. The sudden increase in flow rate in Figure C.3 at that time is associated with the sprinkler actuation. A comparison of flow rates for Tests 1 and 3 indicates more flow through the passive return in Test 3 compared to Test 1. This is expected since 200 cfm of ventilation was supplied the guest room in Test 3. The bathroom exhaust and leakage, however, accounted for most of this ventilation.

Tests 1 and 2 were the same except that the guest room door was open in Test 2. In contrast to Figure C.1, the flow rate indicated in Figure C.2 is low and approximately constant. Obscuration and carbon monoxide levels in the guest room were quite low in Test 2. Apparently, flow through the door provided an effective means of removing smoke from the guest room (compare Figures 11 and 13).

In Test 4, the door to the guest room was open, however, the door connecting the corridor to an existing test facility was closed. Ventilation in the corridor was set at 200 cfm. From the beginning of Test 4 until approximately 4 hours into the test, about 40 cfm of the flow from the corridor passed into the passive return, providing some mixing in the guest room. A malfunction in the electronic manometer occurred approximately 4 hours into the test.

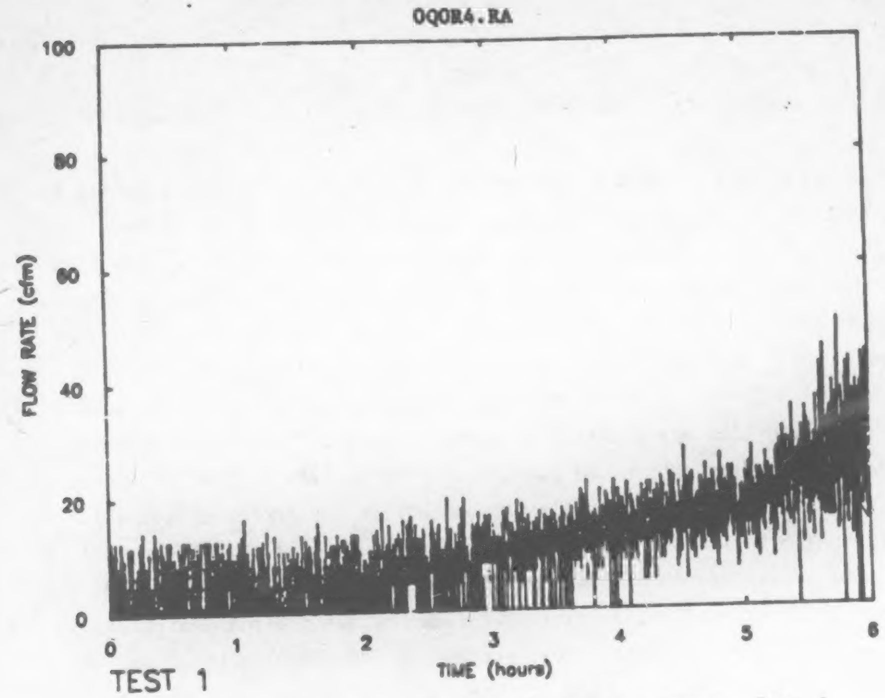


Figure C.1. Ventilation Through the Passive Return, Test 1.

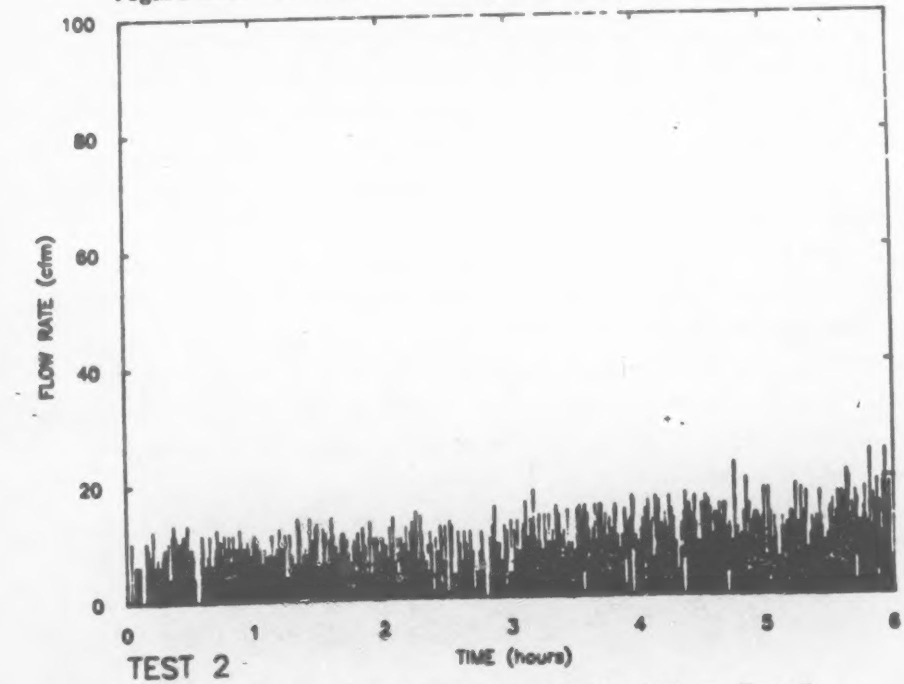


Figure C.2. Ventilation Through the Passive Return, Test 2.

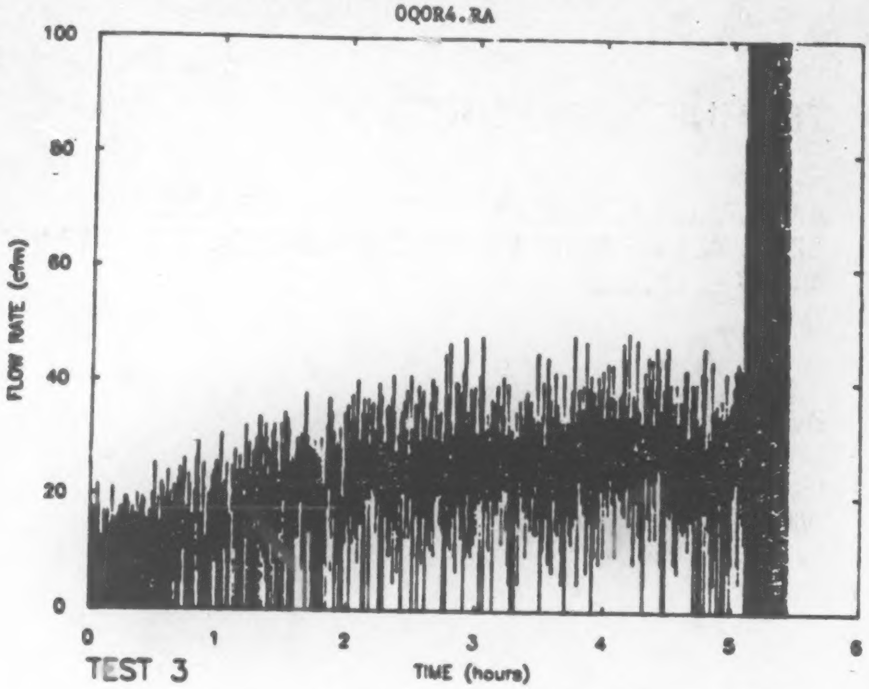


Figure C.3. Ventilation Through the Passive Return, Test 3.

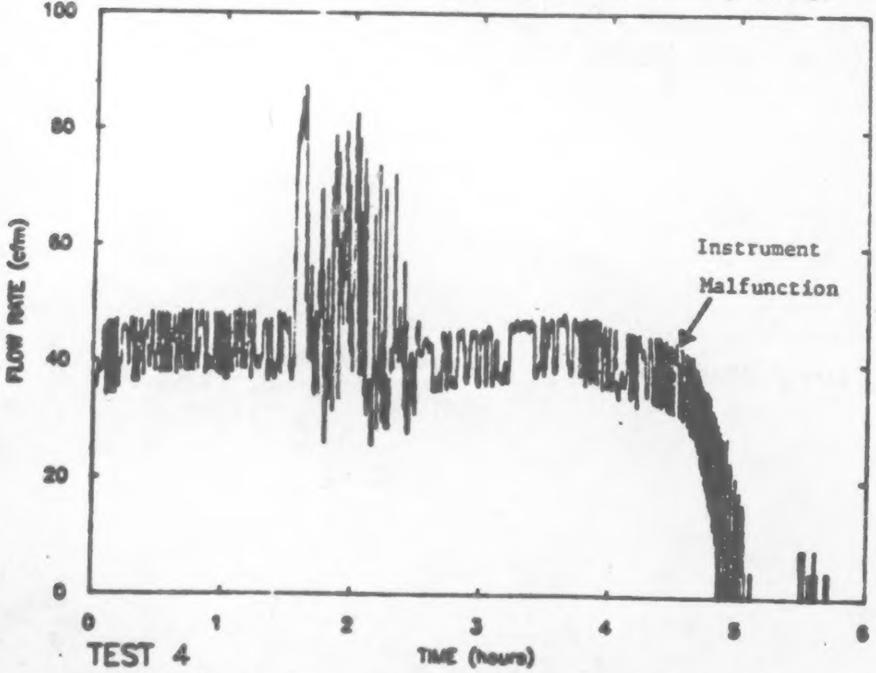


Figure C.4. Ventilation Through the Passive Return, Test 4.

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TECHNICAL REPORT

AN EVALUATION OF EXTENDED COVERAGE, SIDEWALL SPRINKLERS AND SMOKE DETECTORS IN A HOTEL OCCUPANCY

By
Robert G. Bill, Jr.
Hsiang-Cheng Kung
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Prepared for:
Federal Emergency Management Agency
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Factory Mutual System

Factory Mutual Research

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ABSTRACT

Twelve fire tests were conducted in a simulated hotel guest room and corridor to evaluate the performance of extended coverage horizontal sidewall sprinklers equipped with fast response links and the performance of light-scattering and ionization smoke detectors. Eight of the tests were flaming-started fire tests in which ignition occurred by electric match in a metal waste-paper basket. In these eight tests, two different scenarios were used. In one scenario, the waste-paper basket was adjacent to a chair placed in a guest room corner next to a table and drapes. In the other scenario, ignition was adjacent to a bed. Four flaming-started fire tests were conducted for each scenario. All furnishings except the table were acquired from a hotel furnishings vendor. The remaining four tests were smoldering-started fire tests in which smoldering was initiated in a bed with an immersion heater placed under the sheets. Four different ventilation conditions were used in the flaming-started and smoldering-started fire tests: (1) guest room and corridor ventilated with the guest room door open; (2) the same condition as (1) with the door closed; (3) guest room unventilated and corridor ventilated with the guest room door open; and (4) the same conditions as (3) with the door closed. In all of the tests, the fire was suppressed by the extended coverage sprinkler, and survivability criteria based upon 5 ft level gas temperatures and time integrated carbon monoxide concentrations were deemed to be satisfied. Obscuration in the guest room approached 100% before sprinkler actuation and remained at these levels in all tests. Ventilation was not a significant factor affecting sprinkler performance. In tests with the guest room door closed, all guest room smoke detectors responded sufficiently in advance of the sprinklers to provide significant early warning to occupants seeking to escape. In tests with the door open, the corridor detector also responded in advance of sprinkler actuation.

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The guidance of Mr. Jeffrey Newman in the installation of obscuration meters was crucial to completing the objectives of this research. We further wish to acknowledge Mr. Robert Harriman and Ms. Judi Steciak for their technical support of computer hardware and data acquisition and reduction software, without which this project could not have been completed in a timely fashion. Finally, we express our thanks to Mrs. Eleanor Knight for her editorial support.

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I
INTRODUCTION

1.1 HOTEL FIRES IN THE UNITED STATES

Hotel fires in the United States remain a significant threat to life and property. In 1986, the National Fire Protection Association (NFPA) estimated that 50 deaths and 325 injuries occurred in hotels in the United States(1). Property damage from the estimated 8000 hotel fires was $70,000,000(1). Five of these fires involved losses of over $1,000,000 for a total of $7,410,000(2), and three of the fires were multiple death fires in which more than 3 people died for a total of 11 deaths(3). These statistics do not include the 97 deaths and 140 injuries which occurred in the fire at the DuPont Plaza Hotel in San Juan, Puerto Rico on December 31, 1986(4). Although deaths and injuries in hotel fires represent only a small fraction of the total fire deaths for the Unites States, such fire incidences as the DuPont Plaza fire, as well as fires at the MGM Hotel in Las Vegas, Nevada in 1981 (85 deaths, 100 injured(5,6)), and the Stouffer's Inn in Harrison, New York in 1980 (26 deaths, 40 injured(5,7)), continue to concern the public. In a hearing on the Hotel/Motel Fire Safety Act of 1988 (HR3704) before the House Subcommittee on Science, Research and Technology, Clyde A. Bragdon, Jr., Administrator of the U.S. Fire Administration, endorsed the use of automatic sprinklers and fire detection systems to enhance the safety of the traveling public and to protect against property damage(8).

The hotel industry has increasingly made use of new life safety technology to reduce fire deaths and injuries. The NFPA reports that in 1980, 11.5% of fires in hotels occurred in sprinklered structures. By 1984, the percentage had increased to 17.6%(9). The American Hotel and Motel Association reports that from 1980 to 1983, the use of sprinkler systems more than doubled and the use of smoke detector equipment increased by a factor of four(10). Over the five-year period from 1979 through 1983 fire deaths decreased from 140 to 80 per year, while the number of injuries decreased from 1,225 to 450. Property losses decreased from $100,000,000 to $64,000,000(10). These statistics appear to justify the optimism that present technology can prevent fire disasters in hotels.

1.2 LIFE SAFETY SPRINKLER TECHNOLOGY

The United States Fire Administration began a program of research on life safety sprinkler technology in 1976. The program resulted in the complete revision of installation standards for one- and two-family dwellings and mobile homes (NFPA 13-D)(11) and the development of approval standards for a new kind of sprinkler, the residential sprinkler(12,13). The residential sprinkler combines a decreased response time resulting from new sprinkler link technologies with a precise water distribution designed specifically for residential situations. The development of fast-response links has lead to their use in other sprinklers. For example, Factory Mutual Research Corporation developed the ESFR (Early Suppression Fast Response) sprinkler for high challenge industrial fire situations(14), and several conventional sprinkler frames have been equipped with fast-response links and listed by Underwriters Laboratories' (UL). Among these latter types of sprinklers are extended coverage horizontal sidewall sprinklers (hereafter referred to as ECHS). The extended coverage sprinkler as defined by UL is an automatic sprinkler "...intended for use at greater than standard spacing" designed "...to discharge water under a ceiling without obstructions at a specified minimum operating water flow rate"(15). UL defines sidewall sprinklers to be "...intended for installation near the wall and near the ceiling, and intended to discharge water onto the walls and outward in a quarter-spherical pattern"(15). The response time requirement for the extended coverage sprinkler is based upon a comparison with response times of a conventional sprinkler installed at the maximum standard spacing. Thus, at the present time the contribution of the fast-response link to the extended coverage sprinkler is not recognized. The listing procedure only assures that the sprinkler listed for extended coverage responds at least as rapidly as conventional sprinklers installed at standard spacing. Fast-response technology other than for residential sprinklers is only explicitly listed by UL as a "quick-response" sprinkler for standard spacings(16).

Despite the lack of special standards for ECHS sprinklers equipped with fast-response links, considerable interest has been shown in such sprinklers as aids to life safety in hotels. Two preliminary demonstration tests with limited instrumentation have been conducted. In the tests sponsored by the U.S. Fire Administration and managed by the National Fire Protection Research Foundation, it was determined that "in the eight flaming-started tests in which sprinklers were provided, the fast-response sprinklers [ECHS] controlled the fire and the critical limits established for survivability were not exceeded"(17). Only one test of a ECHS sprinkler in a simulated hotel guest room was sponsored by the International Association of Fire Chiefs, the Marriott Corporation and the San Francisco Fire Department (Operation San Francisco)(18). The gas temperature in a guest room at the 5 ft level reached a peak of 174°F and the room was not considered viable regarding life safety. We note that in both series of tests (References 17, 18) 150°F was considered to be the maximum permissible gas temperature. (We will return to this point when we discuss the issue of tenability criteria in the following section.) A review of the data from References 17 and 18 clearly indicates the promise of the ECHS sprinkler equipped with a fast-response link for maintaining life and property in hotel occupancies.

Our approach in this study was to provide a clearer indication of the performance that could be expected from the ECHS sprinklers through the use of a listed sprinkler, furnishings supplied by a hotel vendor, more extensive instrumentation than in previous studies (17, 18), and rapid acquisition of data (1 scan/s). Furthermore, water flow to actuated sprinklers was precisely monitored and water distribution measurements at fire source locations were obtained.

A particular focus of this study was to determine the effect of ventilation on sprinkler performance, as well as on smoke detector performance (see below) in a hotel guest room and adjoining corridor. Four different ventilation conditions were investigated for each of two different flaming-started fire scenarios. One fire scenario consisted of a chair, waste-paper basket, table and drapes; the other scenario was a waste-paper basket adjacent to a bed. In addition, four smoldering-started fire tests with the same four ventilation conditions were conducted using a bed scenario.

1.3 SMOKE DETECTOR TECHNOLOGY

In both the hotel tests at Fort Lauderdale(17) and the tests in Operation San Francisco(18), photoelectric and ionization smoke detectors were installed. In all tests, the smoke detectors operated and provided additional warning prior to sprinkler operation. In the Fort Lauderdale tests(17), it was noted that detector sensitivity was between 0.86 and 2.12 percent obscuration/ft, near the lower end of the UL production limit. A present concern of U.S. fire departments is the large numbers of false alarm calls from detector systems(19). One means of reducing this problem is to decrease the sensitivity of detectors. In the present study, light-scattering detector sensitivity was nominally 3%, near the less sensitive upper end of the UL production window limits. The performance of these light-scattering as well as ionization smoke detectors have been evaluated in regard to life safety in both the guest room and corridor. In addition, the relationship of smoke detector response to the sprinkler response has also been addressed in regard to the benefits of installing both types of systems.

1.4 LIFE SAFETY CRITERIA

Considerable research effort has been made to quantify the effects of fire products on human health. Some recent reviews of research on the causes of death in fires are available in References 22, 23 and 24. The primary threats to life caused by fire products are categorized in Reference 22 as thermal, chemical and extrinsic. Thermal effects of fire include direct burns, as well as general hyperthermia or shock due to the high temperature of fire products. Purser(23) indicates that the primary chemical effect of fire is narcosis caused chiefly by carbon monoxide, hydrogen cyanide, low levels of oxygen and high levels of carbon dioxide. All three reviews indicate carbon monoxide to be the primary contributor to deaths in fires. The extrinsic category of endangerment(22) due to fire refers to conditions such as disorientation, panic, emotional stress, accidents or other trauma, and additive strain from pre-existing health conditions. Such conditions are difficult to quantify; however, they may be related to irritant gases and vapors such as hydrogen chloride and particulates which irritate the eyes and respiratory system while decreasing visibility. Such effects "all enhance the anguish of the fire victim"(22).

A review of tenability criteria from References 22, 23 and 24 indicates a wide range of results from various investigators. Research indicates that maximum survivable levels of either temperature or gas concentration levels depend on time duration. As a further complication, mixtures of concentrations of gases typical of fire products and activity levels of occupants are also known to affect the concentration and time limits. Obviously, quantification of the physiological effects of combustion products on humans remains inprecise. As a result, different life safety criteria have been used in various fire safety studies.

In Table 1, the tenability criteria used in four different fire test studies are compared. The four studies are the two hotel tests(17,18) mentioned in Section 1.2, the Los Angeles Residential Test Program(25) and a review by Newman and Khan of standard test criteria for underground fire detector systems(26). The interpretation of tenability was somewhat different in each of the reported studies. In the Los Angeles Residential Test Program(25) the tenability criteria referred to the ability of an occupant in the room of fire origin to survive at least 15 minutes after sprinkler actuation. The limits on carbon monoxide concentration correspond to values for which headaches and abnormal vision may result. The temperature limits correspond to an upper limit at which loss of consciousness will not occur. Note that the limit established for ceiling surface temperature was established to assess the ability of sprinklers to provide structural protection. The criteria of the Los Angeles Residential Test Program are widely cited since data from that study served as a basis for the revision of NFPA 13-D.

In the Fort Lauderdale study(17), two types of tenability are listed for fire product concentrations, a short term lethal criteria (10 minutes) and longer time period criteria (30 minutes) for which it is judged that an individual might escape without irreversible health effects or physiologic effects that would impede escape. Furthermore a temperature limit of 150°F for a period of one minute was selected, since it was judged that such a condition could be endured during the one minute that was judged to be needed to reach exits. A limitation on the smoke obscuration of 45% over a 1 meter path length at eye-level (5 ft) was also set to allow occupants to safely escape the room of fire origin. It is noted, however, that survivability in the room of fire origin was judged to be maintained if the other criteria were satisfied even if obscuration exceeded this value.

In the San Francisco study(18), tenability was established based on effects due to fire that were judged to be just sufficient to affect an individual's escape potential. The criteria of Newman and Khan(26) are similarly based upon the ability of an occupant to escape rather than to survive in the location of fire origin. Note that Newman and Khan(26) also

TABLE I
COMPARISON OF TENABILITY CRITERIA

Hazard	Ft. Lauderdale(17)	Operation San Francisco(18)	Los Angeles(25)	Newman* and Khan(26)
Gas Temperature (°F at 5 ft)	150 (1 minute)	150	200	200
Ceiling Surface Temperature (°F)	-	-	500	-
CO (ppm)	5,000 (10 min) 1,500 (30 min)	3,000 (5 min)	3,000 (15 min) 43,000 ppm-min	1,500-4,000
HCN (ppm)	350 (10 min) 50 (30 min)	150 (5 min)	-	30-100
HCl (ppm)	500 (10 min) 50 (30 min)	200 (5 min)	-	50-1,000
Obscuration (%, over 1 meter)	45	68	-	20**
(%, over 1 ft)	17**	29**	-	6**
O_2 (%, minimum)	-	-	-	6-10
CO_2 (%)	-	-	-	4-8

*1 min. to 30 min. duration.

**Calculated values.

cited limits for gases not typically thought to be the primary cause of death in fires (Benzene, $NO + NO_2$, SO_2, Cl_2, $COCl_2$ and NH_3).

Haber's rule(28) suggests that physiological effects for a given time integrated value of gas concentration are equivalent. The 30 and 15 minute criteria cited here for carbon monoxide and hydrogen cyanide are reasonably consistent with time integrated values reported recently by Hartzell(27) of 35,000-45,000 ppm.min and 1500 ppm.min for carbon monoxide and hydrogen cyanide, respectively. For comparison, estimates of one hour lethal concentration limits are given in Table II.

The lack of criteria for oxygen in Studies 17, 18 and 25 may be explained by the typically secondary role that oxygen deficiency plays in pre-flashover fires(22). In regard to HCN and HCl, note that in the simulated living room fire tests reported by Bill et al(29) involving reclining chairs with a vinyl covering and polyurethane foam padding, peak HCN and HCl concentrations were typically less than 30 ppm.

The physiological effects of elevated temperatures on humans as reported in Reference 22 are cited in Table III. A comparison of Table I and Table III suggests that References 17 and 18 have chosen a gas temperature appropriate for a longer time period than the gas concentration limits which were set at no more than 30 minutes. The gas temperature criteria cited in Table III suggest that a limit of 220°F for a twenty-five minute period would be more appropriate.

Table I indicates a wide range over which obscuration caused by smoke has been judged to impair significantly the ability of a person to escape during a fire. In contrast to variations in reported obscuration criteria, it is useful to recall that Carmak in a review of human behavior in fires(30) has observed that "there seemed to be agreement that blindness [due to smoke] increases fear many times. . . . [while] if people can see an exit, they do not tend to panic." In a review of critical smoke levels for escape, Harpe et al(31) judged that an optical density of 0.07 per foot appears to be a reasonable upper limit. This corresponds to an obscuration of 15% over a 1 ft path length and is approximately midway between those values cited in Table I.

Acknowledging the range and uncertainty of data on fire hazards, as well as the various tenability criteria applied in previous fire tests, we have adopted the life safety criteria of the Los Angeles Fire Test Program(25). We note that the limits of that program, as well as other limits cited in

TABLE II

GENERAL ESTIMATE OF ONE-HOUR LETHAL CONCENTRATION(22)

Hazard	Concentration
CO	4,000 ppm
O_2	9% (less than)
CO_2	10%
HCN	200-300 ppm
HCl	1,000 ppm
HBr	1,000 ppm
SO_2	400-500 ppm
NO_x	200-400 ppm

TABLE III

PHYSIOLOGICAL EFFECTS OF ELEVATED TEMPERATURES ON HUMANS

Gas Temperature (°F)	Tolerance Time (minutes) or Effect
220	25
240	20
248	15
260	Nasal breathing difficult
264	5
300	Mouth breathing difficult, temperature limit for escape
320	Rapid unbearable pain to dry skin

Tables I and II, do not take into account synergetic effects due to combinations of toxic gases. As an example, Reference 22 indicates that toxic effects of CO and HCN may be additive. Furthermore, the survivability criteria used in the Los Angeles Test Program and in the present study assume that occupants are not directly engulfed in flames nor remain very close to the fire source. We also emphasize that the survivability criteria can be satisfied although obscuration exceeds limits cited above, for which researchers have judged that escape potential may be significantly impaired. The survivability criteria are established with the purpose of allowing occupants in the room of fire origin sufficient time to be rescued, if necessary. The time duration associated with these limits in the present study is 30 minutes.

II

EXPERIMENTAL FACILITIES

2.1 TEST FACILITY

A simulated guest hotel room measuring 13 ft 6 in. by 29 ft 5-1/2 in. was constructed along a corridor 6 ft by 40 ft (see Figure 1). The simulated hotel guest room and corridor were constructed to simulate typical hotel/motel occupancies in the United States. In a survey of hotel guest room dimensions, Rutes and Penner(32) indicate typical "first class" living areas, bathroom and total guest room dimensions to be 13 ft 6 in. x 19 ft, 5 ft 6 in. x 8 ft 6 in., and 13 ft 6 in. x 28 ft 6 in., respectively. For comparison, the corresponding dimensions indicated for "budget" hotels are 11 ft 6 in. x 15 ft, 5 ft x 5 ft, and 11 ft 6 in. x 20 ft 6 in. The simulated guest room was constructed to be one foot longer than the typical "first class" guest room in order to test the maximum longitudinal distance allowed by the sprinkler manufacturer. Note that the width of the guest room was the same as that of the typical "first class" room. Other dimensions not critical to this study were similar to those of the first class occupancy.

The ceiling height of the living area of the guest room was 8 ft, while the ceiling height in the foyer and bathroom was 7 ft 2-1/2 in. These heights are typical of the ceiling in a hotel room in which a dropped ceiling is used to provide space above the foyer and bathroom for a plenum used as the ventilation air supply. In Figure 1, the locations of the air supply register, bathroom exhaust and air return are noted. Ventilation conditions will be discussed in the following section.

The guest room shown in Figure 1 connected through a doorway (6 ft 10 in. x 2 ft 7 in.) to a simulated hotel corridor. The corridor, 8 ft high by 6 ft wide was 38 ft 8 in. long and connected to an existing one-story test building ("HUD building," Figure 1) with dimensions of 23 ft 2 in. x 38 ft x 8 ft. The hotel guest room and corridor were enclosed within a larger test volume (60 ft x 40 ft x 33 ft). Fire products were vented through the corridor to the "HUD building" rather than to the surrounding enclosure to provide a simulation of smoke flow through a hotel. The location of the corridor air supply is shown

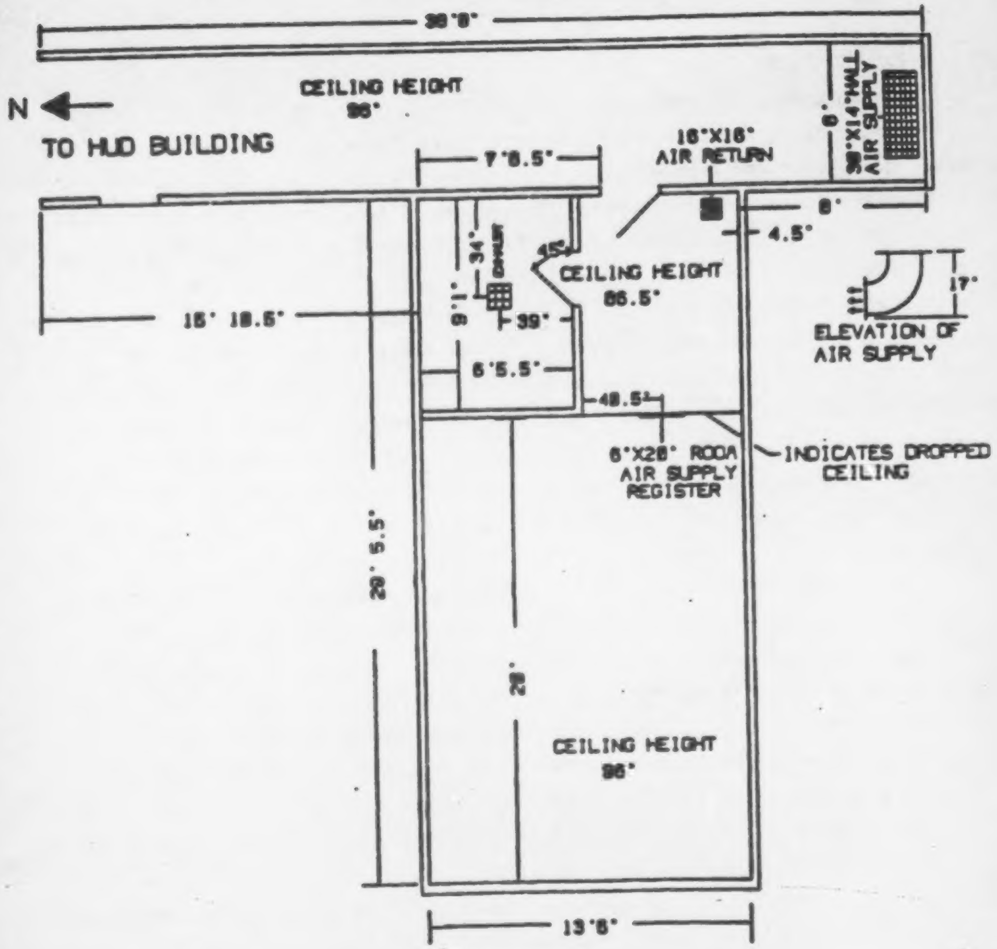

38'8"
CEILING HEIGHT
96"
N
TO HUD BUILDING
7'8.5"
16"X16"
AIR RETURN
6"
38"X14" WALL
AIR SUPPLY
8"
4.5"
34"
EXHAUST
45°
CEILING HEIGHT
86.5"
17"
ELEVATION OF
AIR SUPPLY
15' 10.5"
9'1"
39"
6'5.5"
48.5"
8"X28" ROOM
AIR SUPPLY
REGISTER
INDICATES DROPPED
CEILING
20' 5.5"
28'
CEILING HEIGHT
96"
13'6"

Figure 1. Plan View of Guest Room and Corridor.

in Figure 1. At that end, the corridor was blocked in order to keep air from being entrained from the surrounding enclosure into the corridor. The total flow supplied by the corridor air supply could then be precisely measured (Section 3.2).

The guest room and corridor were fabricated using 2 in. x 4 in. studs and 2 in. x 8 in. ceiling joists. The walls and ceiling were covered with 1/2 in. plaster board. Joint compound was used to seal the spaces between plaster boards.

2.2 VENTILATION SYSTEMS

Ventilation was furnished to the guest room and corridor to simulate air movement in such an environment. Air was supplied from the surrounding enclosure to the guest room and corridor by two independent ventilation systems using low pressure centrifugal blowers. In Figure 1, the location of the guest room air supply (a 6 in. x 20 in. louvered register) and the corridor air supply (a 30 in. x 14 in. louvered register) are noted. Two exhausts were installed within the guest room: a passive return register (16 in. x 16 in.) attached to an 8 ft vertical stack on the roof of the hotel test room facility; and a commercial 100 cfm bathroom exhaust (see Figure 1). Air from the guest room exhausts flowed to the larger enclosure in which the hotel test facility was located. All air was supplied from the surrounding enclosure and no attempt was made to simulate effects of recirculating systems. As noted in the previous section, air movement in the corridor was exhausted into a previously existing one-story building. During fire tests, products of combustion from the 8 ft stack above the passive return were visibly convected to nearly the top of the 30 ft ceiling of the larger enclosure and did not appear to mix with air supplied to the guest room and corridor by the two blowers at a 9 ft level.

Minimum levels of ventilation for acceptable indoor air quality in hotels are reported in ASHRAE Standard 62-1986(33) and by Jennings(34). For single or double bedrooms, ASHRAE 62-1981 indicates a minimum ventilation requirement of 30 cfm. Fifty cfm is required for baths or toilets attached to the bedroom. (These requirements assume 100% outside air.) Jennings specifies minimum ventilation requirements in terms of minimum air flow per floor area. For hotel rooms and bathrooms, this quantity is 0.33 cfm/ft^2 and 2 cfm/ft^2, respectively. In our study this would correspond to flow rates of 109 cfm and 118 cfm, respectively, in the guest room and bath room.

In our study, we supplied 200 cfm of air through the register at the entry of the living area of the guest room. This represented approximately four room changes per hour. Exhaust was then through the passive return and the 100 cfm commercial exhaust in the bathroom. Flow rates from the blower to the guest room supply register were set through the use of pressure measurements one diameter upstream and one-half diameter downstream of a circular orifice plate (4 in. diameter hole) within an 8 in. circular supply duct. (Measurements were obtained following guidelines of Reference 35.) We note that air velocity in the center of the living area of the guest room measured less than 1 ft/s under normal conditions without fire and that air flow would be only barely discernable by an occupant.

Air flow to the corridor was supplied at a flow rate of 1440 cfm which calculates to an average flow speed of 30 fpm. For comparison, a discussion of air distribution in rooms in Reference 36 suggests 35 fpm as an upper limit if the sensation of "drafts" is to be avoided. As in the case of the guest room, air movement in the corridor was barely discernable.

2.3 FURNISHINGS

Nominal dimensions, weight and composition of furnishings used in this study are shown in Table IV. All furnishings (except the table) were supplied by a New England hotel furnishings vendor. These furnishings are acceptable for hotels throughout New England with the exception of the chair which is not acceptable in Boston and the drapes which are not acceptable in all of Massachusetts.

The bed mattress and box spring were in compliance with the Consumer Product Safety Commission Mattress Flammability Standard #16, Center for Fire Research 1632 and passed the Federal Flammability Standard. The bedspread and drapes were treated with fire retardant chemicals and met U.S. Federal Specification CCC-T-191A. The chair was manufactured to pass Upholstered Furniture Action Council's specification for upholstered furniture, which certifies that the cover and filling material have been modified to reduce ignition by a burning cigarette.

TABLE IV
FURNISHINGS

Item and Dimensions	Manufacturer/Model	Description of Key Contents
Bed Mattress (53"x75"; 60 lb)	Serta/Northeast/SE-3	50% blended cotton felt 50% polyurethane
Box Spring (53"x75"; 54 lb)	Serta/Northeast/SE-3	Cellulose fiber pad
Mattress Pad (53"x75"; 1.25 lb)	Pillowtex Corp./53" x 75"	Resin treated polyester fiber
Sheets (81"x104"; 1.25 lb)	Stevens/81" x 104"	Polyester/cotton percale
Bedspread (101"x117"; 4.25 lb)	J.P. Stevens/101" x 117"	Resin treated polyester fiber
Blanket (80"x90"; 2.75 lb)	Manetta Mills Inc./ Regency Full	Acrylic
Pillows (20"x26"; 1.25 lb)	Purofield Down Products Corp./20" x 26"	Polyester fiber
Chair (26"Hx28"Wx24.5"D; 38 lb)	Fairfield/Style #8241	Body: 70% blended cotton batting 30% polyurethane foam Seat: 80% polyurethane foam 20% resin treated polyester fiber
Drapes (72"x96"; 7.25 lb)	Thoro-Sheen Co./72" x 96"	50% cotton 50% polyester
Table (34"D;30"H; 26 lb)	Leggett & Platt Inc./ 570050 F17 Full	Top: particle board covered with formica Legs: 1.5"x1.5" cut from framing lumber

2.4 TEST SPRINKLERS AND WATER SUPPLY SYSTEM

In each test one ECHS sprinkler equipped with a fast-response link and two pendent sprinklers equipped with fast response links (listed as quick response sprinklers by UL(16)) were installed with the deflectors 4 in. below the ceiling at the locations shown in Figure 2. The same model ECHS sprinkler and the same model pendent sprinklers were used throughout the test program. Both types of sprinklers are 1/2 in. orifice sprinklers with a temperature rating of 165°F and a nominal K factor of 5.5 $gpm/psi^{1/2}$. The RTI of the ECHS sprinkler measured in a plunge test, with the sprinkler in the horizontal position and the gas flow perpendicular to the deflector, was determined to be 53 $(ft\text{-}s)^{1/2}$ for three samples. The RTI of the pendent sprinkler, measured in the normal position, was 47 $(ft\text{-}s)^{1/2}$. The coverage area for the ECHS sprinkler was the entire living area of the guest room. The water distribution patterns of several ECHS sprinklers were investigated prior to selecting a single model for the test series (see Section 3.2). A sprinkler was chosen which provided a relatively uniform horizontal distribution and which wet all walls in the coverage area at least 3 ft above the floor. The pendent sprinklers were installed for coverage of the bathroom and foyer.

Water could be supplied during a single test to as many as three sprinklers. The flow rates for each sprinkler were independently monitored by rotameters. The flow rate for the ECHS sprinkler was 32 gpm as specified by the manufacturer. This provided an average water application density of 0.12 gpm/ft^2 for the coverage area of the guest room. The flow rate for each of the pendent sprinklers was set at 25 gpm. Water was supplied through 1 in. Schedule 80 PVC piping on the test structure ceiling. Connections to the pendent sprinklers through the ceiling were effected by 1/2 in. Schedule 40 steel nipples. The length of the connections was determined by the desired distance of the deflector from the ceiling surface. No escutcheon plates were used with the pendent sprinklers. The ECHS sprinkler was installed on the sidewall at the location shown in Figure 2. An escutcheon plate was used as in a typical installation.

Before each test, the water supply system was pressurized and the flow rate for each individual sprinkler was independently established. In none of the twelve fire tests in this study did the bathroom pendent sprinkler actuate. Typically, the foyer pendent sprinkler actuated first followed by the ECHS sprinkler. When the first sprinkler actuated, the flow rate was manually checked and corrected for any errors. A similar manual procedure was followed when the second sprinkler actuated.

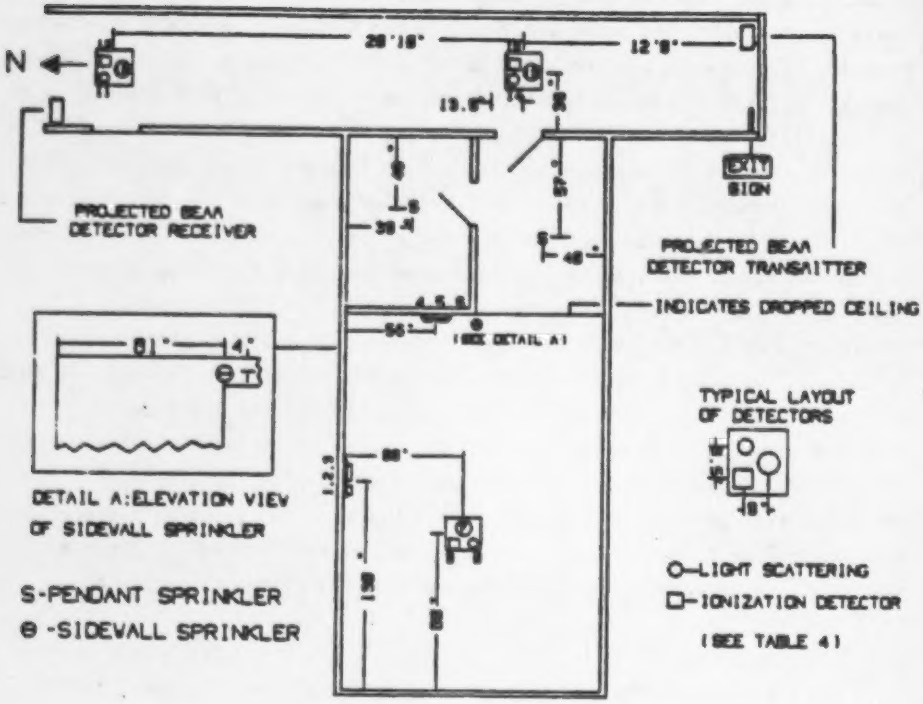

N
28'10"
12'9"
13.5"
EXIT
SIGN
PROJECTED BEAM
DETECTOR RECEIVER
38"
46"
S
S
PROJECTED BEAM
DETECTOR TRANSMITTER
INDICATES DROPPED CEILING
4,5,6
56"
(SEE DETAIL A)
81"
4"
T
DETAIL A: ELEVATION VIEW
OF SIDEWALL SPRINKLER
1,2,3
88"
TYPICAL LAYOUT
OF DETECTORS
8"
S-PENDANT SPRINKLER
⊖ -SIDEWALL SPRINKLER
○-LIGHT SCATTERING
□-IONIZATION DETECTOR
(SEE TABLE 4)

Figure 2. Sprinkler and Smoke Detector Locations.

2.5 SMOKE DETECTORS

The locations of smoke detectors provided by the Research Committee, Signaling and Protection and Communications Section of the National Electrical Manufacturers Association (NEMA) are shown in Figure 2. Numbers shown adjacent to the smoke detector symbols refer to the detector type indicated in Table V. Two different model light scattering detectors were used in the test program. (The models are indicated as "A" and "B" in Table V.) One model of ionization detector was used. The fifteen smoke detectors were grouped into five stations, each with two light-scattering detectors and one ionization detector. Two of the stations were on sidewalls and corresponded to typical locations in hotel rooms. The ceiling detector station in the center of the room (Detectors 7, 8, 9) provided information at a location fully instrumented for gas sampling, temperature, and smoke obscuration. A ceiling detector station outside the guest room door (Detectors 13, 14, 15) provided information on minimum response times that could be expected from corridor detectors. Detectors 10, 11 and 12 were placed nominally 21 ft away, as in a typical installation. The light-scattering detectors had a nominal sensitivity of 3%/ft obscuration while the ionization detectors had a nominal sensitivity of 1%/ft obscuration (sensitivities supplied by NEMA). A projected beam detector (provided by NEMA) was also installed in the corridor 7 in. below the ceiling level. The beam, approximately 2 in. in diameter, diagonally traversed the corridor (Figure 2) and provided an analog output.

2.6 INSTRUMENTATION

The instrumentation used in this study is similar to that used in Reference 29. Figures 3 and 4 indicate the location of thermocouples, brass discs and brass spheres. Thermocouples, fabricated from inconel-sheathed 30-gage chromel-alumel wire were used to measure gas temperature. The brass discs were used to simulate sprinkler response(37) and brass spheres were used to measure gas speed(38). The RTI's(37) of the discs and spheres as measured in a plunge test were respectively 51 $(\text{ft-s})^{1/2}$ and 386 $(\text{ft-s})^{1/2}$. In Figure 3, ceiling and sidewall instrumentation is shown in the living area of the guest room, and in Figure 4 thermocouple "trees" in the guest room are shown along with corridor and foyer thermocouple instrumentation. Note in Figure 3 a detail is given of instrumentation near the location of the ECHS sprinkler equipped with a fast-response link (indicated as θ in Figure 3).

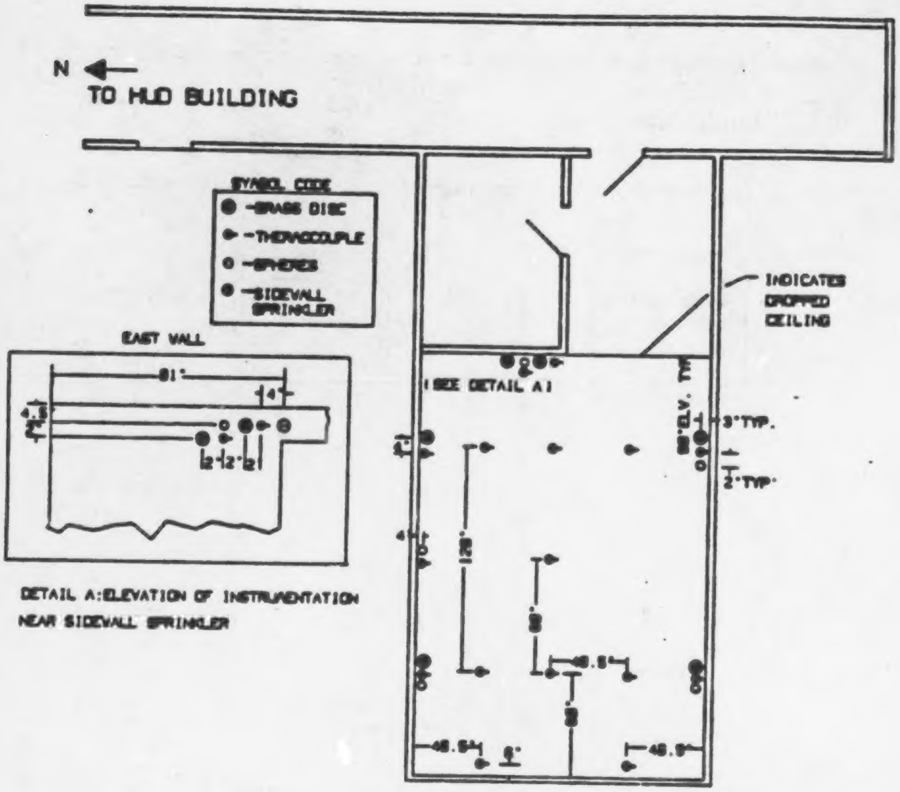

N
TO HUD BUILDING
SYMBOL CODE
● -BRASS DISC
-THERMOCOUPLE
○ -SPHERES
● -SIDEWALL SPRINKLER
EAST WALL
81"
4"
4.5"
2"
2"
2"
2"
INDICATES DROPPED CEILING
(SEE DETAIL A)
88"ELV. TYP
3"TYP.
2"TYP.
4"
120"
48.5"
48.5"
48.5"
6"
DETAIL A:ELEVATION OF INSTRUMENTATION NEAR SIDEWALL SPRINKLER

Figure 3. Guest Room Thermocouple, Brass Disc, and Brass Sphere Locations.

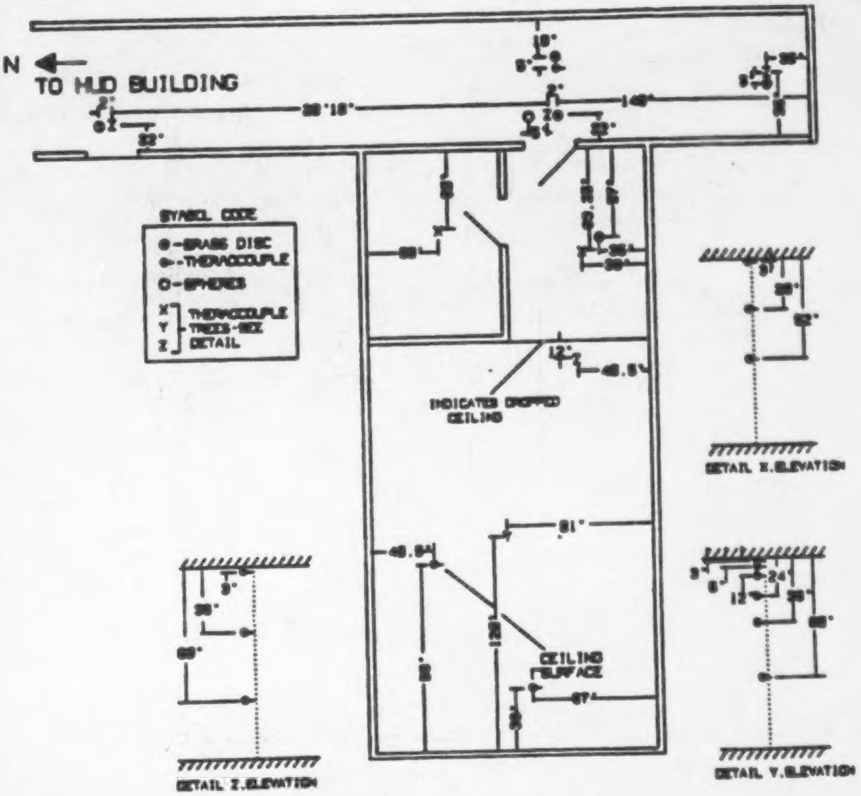

N
TO HUD BUILDING
18"
140"
22"
SYMBOL CODE
● - BRASS DISC
●- - THERMOCOUPLE
○ - SPHERES
X
Y
Z
THERMOCOUPLE TREES - SEE DETAIL
12"
48.5"
INDICATES DROPPED CEILING
DETAIL X.ELEVATION
81"
48.5"
CEILING SURFACE
3"
6"
12
24
DETAIL Z.ELEVATION
DETAIL Y.ELEVATION

Figure 4. Thermocouple Trees and Corridor and Foyer Thermocouples, Brass Discs, and Brass Spheres.

This instrumentation was installed to provide information on sprinkler response at other locations near the actual sprinkler. All instrumentation, shown in Figures 3 and 4, which is shown adjacent to a wall was located 6 in. below the ceiling (except the instrumentation shown in the detail). The remaining instrumentation was mounted 3 in. below the ceiling.

The locations of gas sampling ports in the guest room and corridor are shown in Figure 5. Four gas sampling locations are shown in Figure 5. At all locations, gas sampling occurred at a rate of approximately 10 ℓ/min. The gas samples were drawn to analyzers through 1/4 in. nylon tubing. Gases were passed through a desiccant prior to entering the analyzers. Carbon monoxide and oxygen concentrations were obtained at each sampling location using Beckman 864 and 1755 analyzers, respectively. At the center of the living area of the guest room at the ceiling (3.5 in. below the ceiling) and at the 5 ft levels (see Figure 5), carbon dioxide was obtained using Beckman 755 analyzers (see detail in Figure 5).

Locations of obscuration meters and velocity probes are shown in Figure 6. Obscuration meters were located at four locations within the living area of the guest room (three at the ceiling level; one at the 5 ft level in the center of the room; see detail in Figure 6). The three ceiling-mounted obscuration meters were constructed using the design of Newman and Steciak(39). The pathlength for these obscuration meters was 1 ft. Due to the interference from lighting used for video taping of the fire tests, results from the ceiling mounted obscuration meters near the north and east wall of the living area were not used. The remaining obscuration meter at the ceiling was unaffected. It measured obscuration at three wavelengths, 0.4579, 0.6328 and 1.06 microns. The obscuration meter at the 5 ft level was modified from a commercially available obscuration meter. Measurements were over a pathlength of 1 ft and at a wavelength of 0.94 microns.

Three obscuration meters were installed in the corridor (two at the ceiling level; one at the 5 ft level outside the guest room doorway). All three meters followed the design of Newman and Steciak(39). The pathlengths for these meters were 1 ft, and the wavelengths for all three meters were 0.4579 microns.

Bi-directional probes were installed in the guest room and corridor to provide an indication of air movement during the fire tests. The locations of the bi-directional probes are shown in Figure 6. All probes were positioned

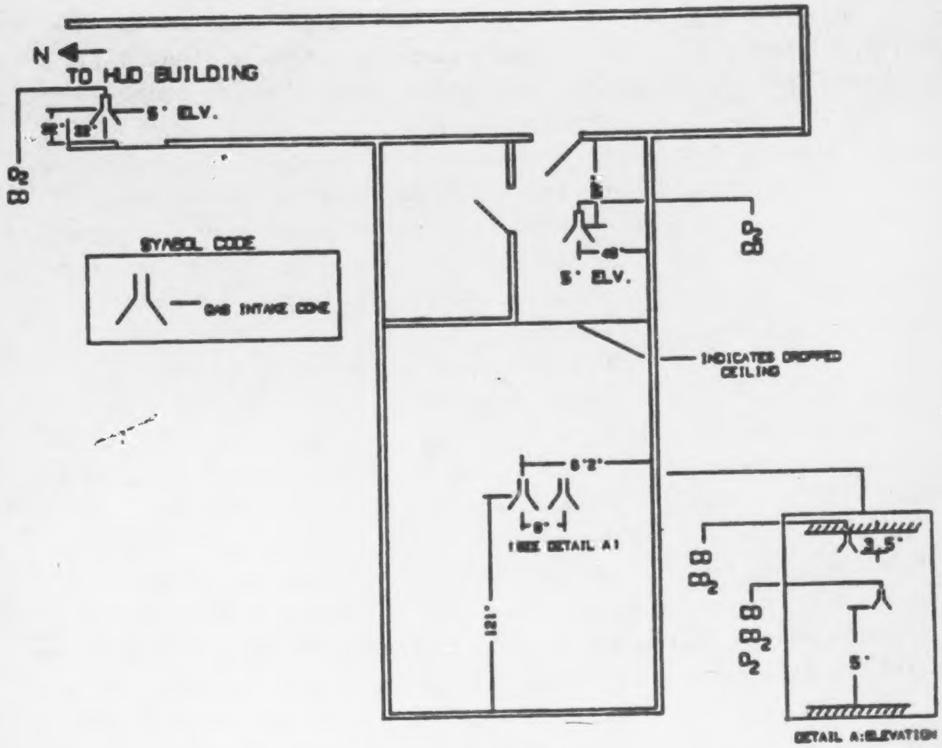

N
TO HUD BUILDING
5' ELV.
32"
32"
O_2 CO
SYMBOL CODE
GAS INTAKE CONE
48"
5' ELV.
O_2 CO
INDICATES DROPPED CEILING
8'2"
8"
(SEE DETAIL A)
121"
CO CO_2
CO CO_2 O_2
2.5"
5'
DETAIL A:ELEVATION

Figure 5. Gas Sampling Locations.

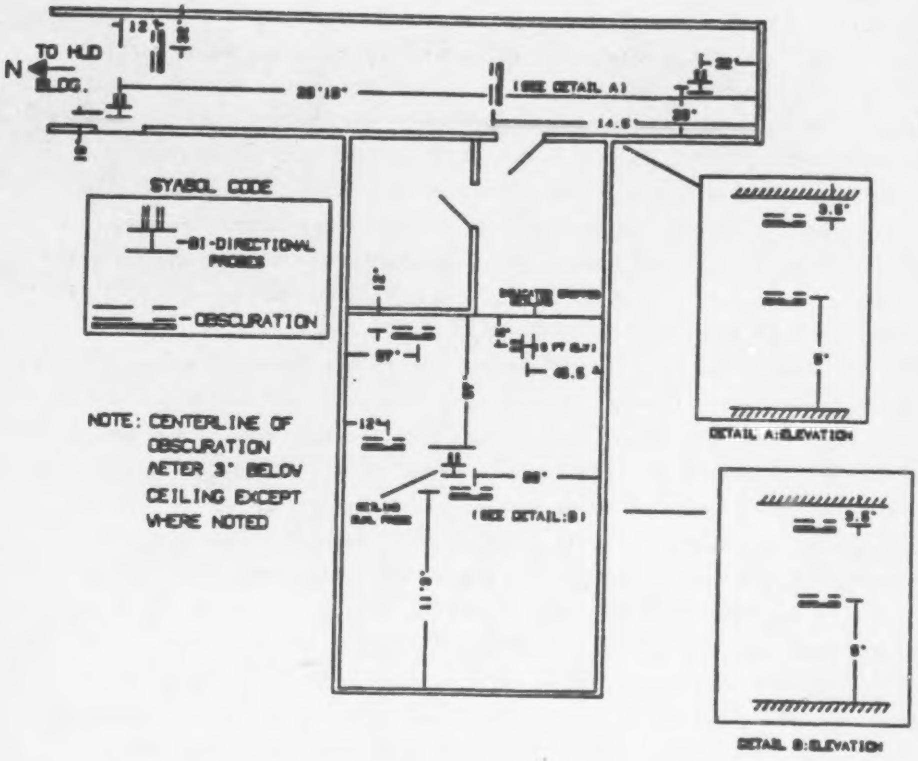

TO HUD BLDG.
N
12"
14.6'
(SEE DETAIL A)
SYMBOL CODE
-BI-DIRECTIONAL PROBES
-OBSCURATION
NOTE: CENTERLINE OF OBSCURATION METER 3" BELOW CEILING EXCEPT WHERE NOTED
(SEE DETAIL:B)
11'9"
9.6"
6"
DETAIL A:ELEVATION
DETAIL B:ELEVATION

Figure 6. Obscuration Meters and Velocity Probe Locations.

3 in. below the ceiling, except one probe placed at a 5 ft elevation in front of the foyer. The orientations of the various probe axes are shown in Figure 6. With the exception of the probe in the center of the living area of the guest room, all probes were constructed as indicated in Reference 40. The velocity probe in the center of the guest room was a dual probe designed by Newman(41) to measure both the direction and speed of gas in a pure ceiling flow. Analysis of the data, however, indicated that significant vertical fluctuating components were present in the velocity, thus only the signal from one of the bi-directional probes of the dual probe was analyzed (see Figure 6 for axis orientation). All of the velocity probes were connected to individual electronic manometers which have been shown to allow reliable measurements of velocities down to 1 ft/s(40). An electronic manometer was also used to measure differences in pressure between the guest room and the surroundings during fire tests. Room pressurization however was typically less than 0.05 mm Hg.

In order to measure the volumetric flow of gas through the passive return in the guest room (Figure 1), a bi-directional probe and thermocouple were placed in the 8 ft vertical stack rising from the return above the test room roof. The bi-directional probe was placed along the centerline of the stack five diameters downstream of an orifice plate with a 4 in. hole (half the diameter of the stack). Previous research(42) indicates that the velocity profile, five diameters downstream of such an orifice plate, is flat due to turbulent mixing. Placement of the probe at this position allowed measurement of the enthalpy flux through the stack.

In each of the tests, data from the instrumentation was acquired using an ADAC Disk Basys System with up to 128 data channels available. The analog signals were digitized using a 12 bit A/D converter. Signals from the chromel-alumel thermocouples were isolated and filtered at 3 Hz using a signal conditioner. Data was acquired at a rate of 1 scan per second. The data was stored on a 10 Mb cartridge for subsequent processing on a DEC PDP11/23 computer. As a visual record, video tapes of all tests were recorded.

III

TEST CONDITIONS AND PROCEDURES

3.1 DESCRIPTION OF TESTS

In a review of hotel fires in the United States from 1971 to 1981, Jones(43) reports that 58% of all hotel fire incidents occurred in bedrooms and were accidental in origin. These accidental bedroom fires account for 44% of all deaths in hotel fires. Of the accidental bedroom fires, 85% of the incidents and 77% of the deaths were attributed to fires in which smoking materials were the source of ignition. With this in mind, we developed bedroom tests which would result in fires comparable to those occurring in the most common type of hotel fire.

Twelve different fire tests were conducted in this test series. These twelve tests consisted of four flaming-started fire tests using a chair, drapes and a table; four flaming-started fire tests using a standard bed; and four-smoldering-started fire tests also using a standard bed.

The test scenarios are listed in Table V along with the test numbers. (The numbering sequence has been revised from the actual order in which tests occurred.) The locations of the furnishings for both the tests using the chair scenario and the tests using the bed scenario are shown in Figure 7. (A description of these furnishings is given in Section 2.3 and in Table III.) The flaming-started bed tests only involved the bed and bed furnishings listed in Table IV, along with a metal waste-paper basket filled with ten sheets of newspaper. For flaming-started chair fire tests, the only furnishings in the room were the chair, drapes, table and a metal waste-paper basket filled with ten sheets from a newspaper (not shown in Figure 7). The metal waste-paper basket was placed on the side of the chair, flush with the corner closest to the table. The detail in Figure 7 illustrates the installation of the drapes with respect to the chair. The drapes were held taut at the bottom using steel rods and hung at an angle to provide a reproducible contact between the chair and drapes, hence to provide a more reproducible spreading of the fire from the back of the chair to the drapes. Ignition in all of the flaming-started fire tests was by an electric match energized remotely from outside the test room. The electric match was inserted at the bottom of the metal waste-paper basket.

TABLE V

SMOKE DETECTOR TYPES AS SHOWN IN FIGURE 2

No.	Type
1	Light-Scattering A
2	Light-Scattering B
3	Ionization
4	Light-Scattering A
5	Light-Scattering B
6	Ionization
7	Light-Scattering A
8	Light-Scattering B
9	Ionization
10	Light-Scattering A
11	Light-Scattering B
12	Ionization
13	Light-Scattering A
14	Light-Scattering B
15	Ionization

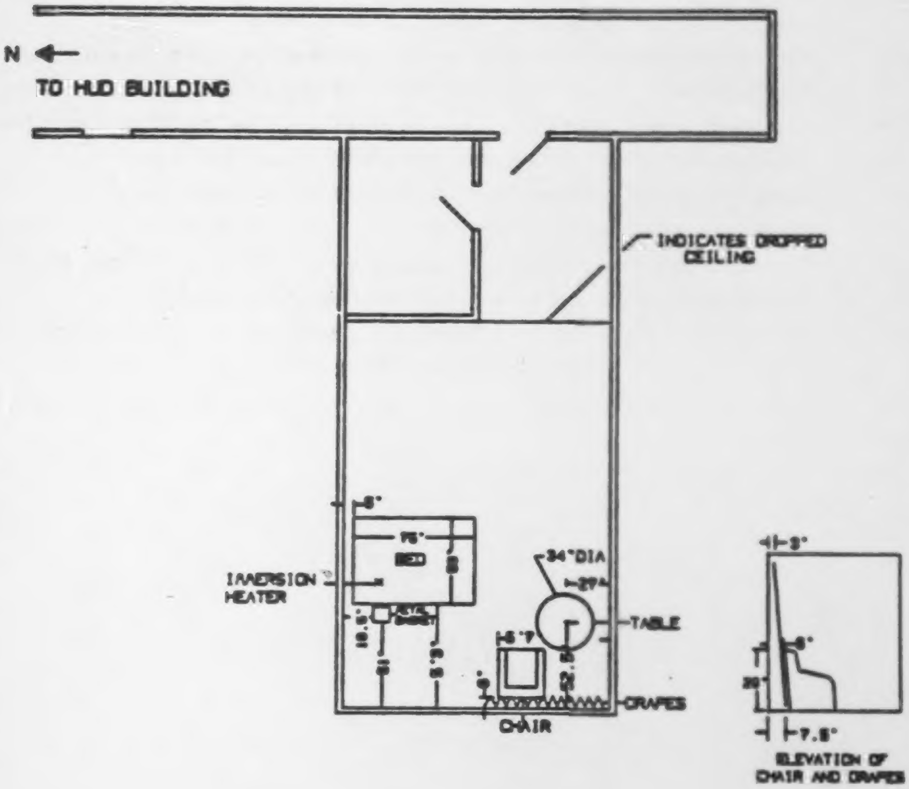

N
TO HUD BUILDING
INDICATES DROPPED CEILING
8"
75"
BED
IMMERSION HEATER
34"DIA
27"
TABLE
DRAPES
CHAIR
3"
8"
20"
7.5"
ELEVATION OF CHAIR AND DRAPES

Figure 7. Locations of Guest Room Furnishings.

TABLE VI
FIRE TEST SCENARIOS

Test No.	Description
1	Flaming-Started Chair Fire Test; Full Ventilation; Door Open
2	Flaming-Started Chair Fire Test; Full Ventilation; Door Closed
3	Flaming-Started Chair Fire Test; Corridor Ventilation Only; Door Open
4	Flaming-Started Chair Fire Test; Corridor Ventilation Only; Door Closed
5	Flaming-Started Bed Fire Test; Full Ventilation; Door Open
6	Flaming-Started Bed Fire Test; Full Ventilation; Door Closed
7	Flaming-Started Bed Fire Test; Corridor Ventilation Only; Door Open
8	Flaming-Started Bed Fire Test; Corridor Ventilation Only; Door Closed
9	Smoldering-Started Bed Fire Tests; Full Ventilation; Door Open
10	Smoldering-Started Bed Fire Tests; Full Ventilation; Door Closed
11	Smoldering-Started Bed Fire Tests; Corridor Ventilation Only; Door Open
12	Smoldering-Started Bed Fire Tests; Corridor Ventilation Only; Door Closed

In the smoldering-started fires, the bed scenario was used. Instead of an electric match ignition, a commercially available immersion heater was placed between the folds of the bed sheets and a pillow (see Figure 7 for location of heater). The power output of the heater was approximately 40 watts. Smoke began to be generated in these tests a few minutes after the immersion heater was energized; however, only in Test 12 did flaming combustion spontaneously result from the smoldering combustion induced by the heater. In Tests 9 to 11, flaming combustion was artificially induced by match ignition applied after a period of 52 minutes at the location of the heater.

Ventilation conditions associated with each test are indicated in Table VI. (The ventilation systems are described in Section 3.2.) In Table VI, tests with "full ventilation" indicate that 200 cfm of air was supplied through the guest room register, the bathroom exhaust was operating (100 cfm), and that 1440 cfm was supplied through the corridor register. "Corridor ventilation only" indicates that the guest room register was blocked; the bathroom exhaust was not on, but 1440 cfm was supplied to the corridor. In all tests, the bathroom door was ajar at an angle of 45°.

Normally one would anticipate that the guest room doors in a hotel would be closed. Half of the twelve tests were conducted with this situation. However, under circumstances, such as when guest rooms are being cleaned, some doors may remain open. For this reason half of the tests were conducted with the door open. In addition, we wished to examine the effect of an open door on visibility in a corridor and on possible impediments to escape that smoke obscuration could cause.

3.2 WATER DISTRIBUTION MEASUREMENTS

In order to estimate the quantity of water applied to the fire sources in our fire tests and variations between sprinklers of the same model type, water application densities (gpm/ft^2) were measured in the areas covering the two fire test scenarios, i.e., the area covering the chair and the area covering the bed. Water was collected in 1 ft x 1 ft pans with 4 in. sides. The pans were placed at a height of 18 in., approximately the height of the bed and the seat of the chair. Results were obtained in the chair area for the ECHS sprinklers used in Tests 1 to 4 and in the bed area for Tests 1, 3, 5 and 9.

Figures 8 and 9 indicate results in the chair and the hypothetical bed area for Test 1. Each figure indicates the location of pans for the water distribution tests in either the chair or bed area. The water application density (gpm/ft^2) for each pan and the average (gpm/ft^2) for the entire collection area is indicated. Typically each water distribution test lasted 12 min. Each water distribution test in the chair area was repeated once. Results were repeatable to within 5%.

Average water application densities are reported in Table VII. Note that the design density is 0.12 gpm/ft^2. Each sprinkler tested, all of the same model, was previously used in a fire test; the fire test number is recorded in the Table. The coverage area designated by "chair" or "bed" is indicative of the distribution tests shown in Figures 8 and 9, respectively. The average water application density in the chair area for eight distribution tests (four different sprinklers) was 0.065 gpm/ft^2 with the average density varying from 0.049 to 0.073 gpm/ft^2. The average water application in the bed area for six distribution tests (four different sprinklers; see Table VII) was 0.047 gpm/ft^2, with the density varying from 0.038 to 0.058. Only two of the water distribution tests were repeated in the bed area. These results were repeatable within 7%.

TABLE VII

AVERAGE WATER APPLICATION DENSITIES

Sprinkler from Test No.	Coverage Area	Application Density (gpm/ft²)
1	Chair	0.073
1	Chair	0.072
2	Chair	0.060
2	Chair	0.057
3	Chair	0.049
3	Chair	0.050
4	Chair	0.078
4	Chair	0.078
1	Bed	0.046
3	Bed	0.046
5	Bed	0.058
5	Bed	0.054
9	Bed	0.040
9	Bed	0.038

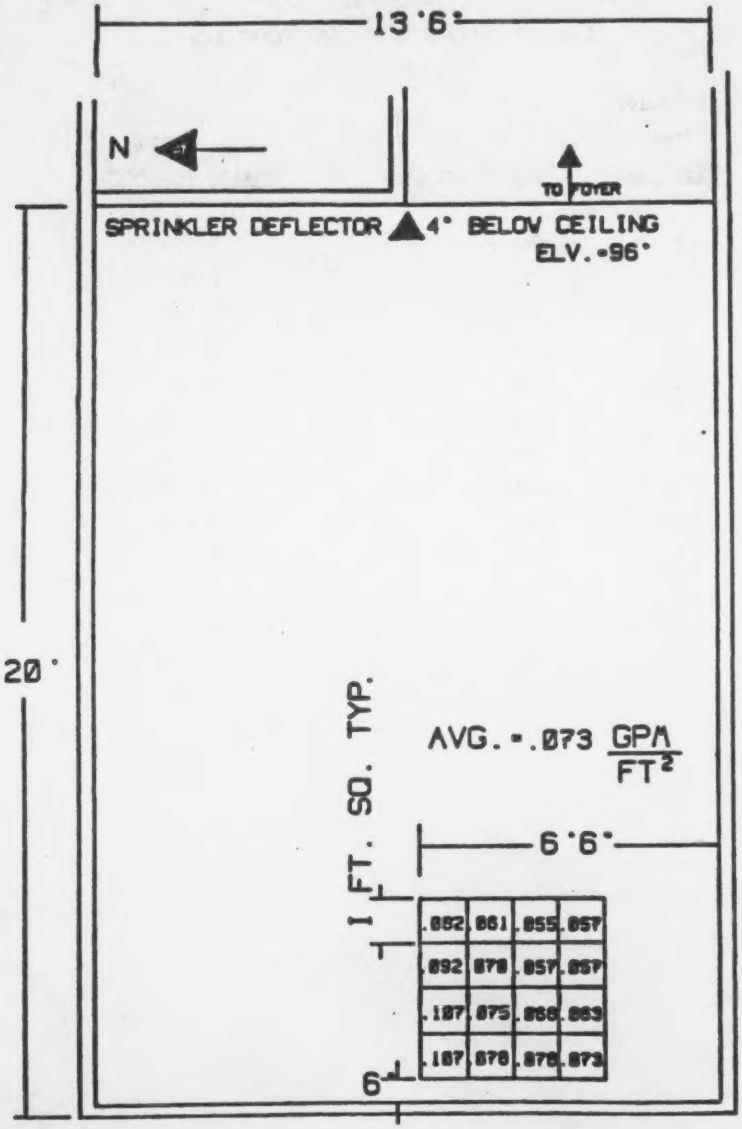
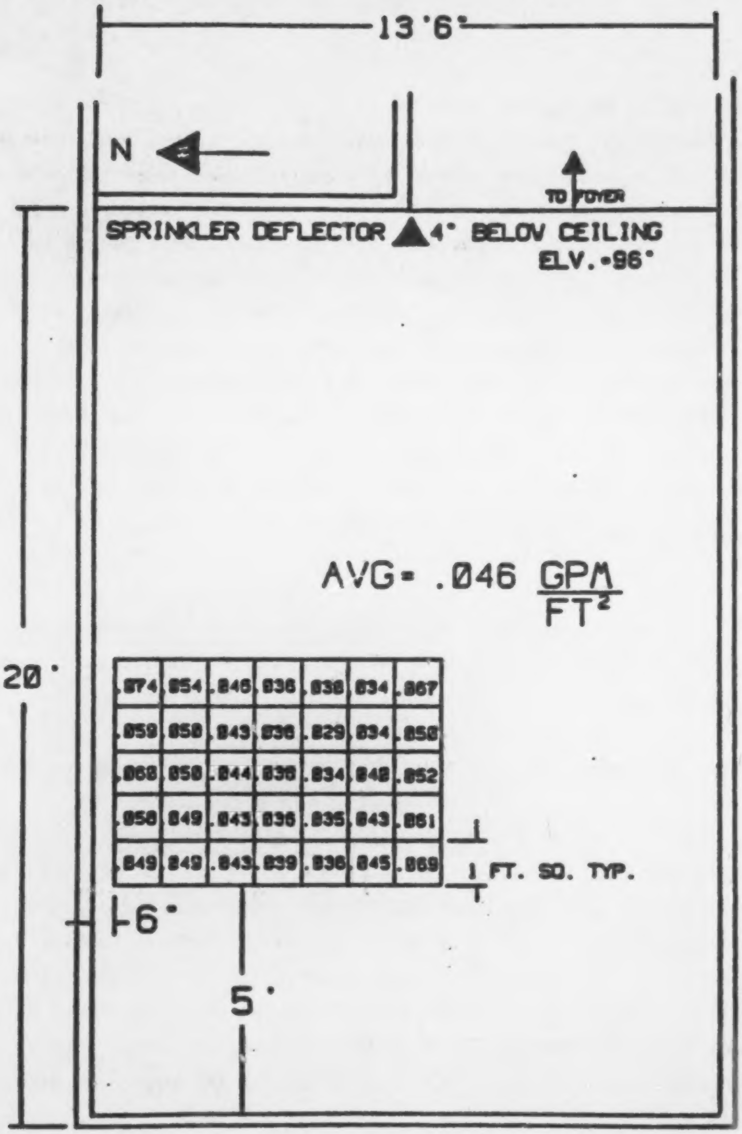

13'6"
N
TO FOYER
SPRINKLER DEFLECTOR 4" BELOW CEILING
ELV.=96"
20'
1 FT. SQ. TYP.
AVG.=.073 GPM/FT²
6'6"
.082 .061 .055 .057
.092 .078 .057 .057
.107 .075 .066 .063
.107 .076 .076 .073
6"

Figure 8. Water Distribution Test in the Chair Area with the Sprinkler Used in Test 1.


13'6"
N
TO FOYER
SPRINKLER DEFLECTOR ▲ 4" BELOW CEILING
ELV.=96"
AVG= .046 GPM/FT²
20'
1 FT. SQ. TYP.
6"
5'

.074	.054	.046	.036	.038	.034	.067
.059	.050	.043	.036	.029	.034	.050
.068	.050	.044	.036	.034	.048	.052
.058	.049	.043	.036	.035	.043	.061
.049	.049	.043	.039	.036	.045	.069

Figure 9. Water Distribution Test in the Bed Area with the Sprinkler Used in Test 1.

IV

RESULTS

4.1 FLAMING-STARTED CHAIR FIRE TESTS

In all four of the flaming-started chair fire tests, the ECHS sprinkler suppressed the fire, and room detectors provided an advance warning before sprinkler actuation. (The minimum advance warning of the detectors prior to sprinkler actuation was 76 s.) Survivability conditions were judged to have been maintained for at least 30 minutes, although gas temperatures at the 5 ft level exceeded 200°F in the center of the room. The survivability criterion of 200°F has been relaxed since room temperatures at other 5 ft level locations were typically less than 200°F. When gas temperatures exceeded 200°F, the duration of these temperatures was less than 20 s and the maximum gas temperature was 226°F. Even though survivability was maintained for 30 minutes, it appeared that escape by the occupants would be hindered since obscuration at the 5 ft level approached 100%/ft obscuration before sprinkler actuation. However at the time of detector response, obscuration was less than 15%/ft and the gas temperature at the 5 ft level was less than 100°F. Thus, the early response of detectors would provide room occupants advantages in terms of improved ease of escape, as well as in terms of decreased health risks. The early warning provided by the detectors indicates that detector sensitivities in the lower sensitivity range of the UL production window such as employed in this study are adequate for this type of fire scenario and occupancy.

Ventilation conditions did not appear to be significant other than relating to conditions in the corridor (door open/door shut). Bi-directional probes indicated that the ventilation system did not create significant air movement compared to that created by the fires. Without fire, ceiling flows were less than 1 ft/s. At the time of sprinkler actuation, ceiling flows were approximately 5 ft/s within the guest room. With the door closed and only corridor ventilation maintained, no corridor detectors responded; the response time for corridor detectors with full ventilation and the door closed was approximately twice that of the extended coverage sprinkler. In tests in which the guest room door was open, corridor smoke detectors responded 7 to 35 s before sprinkler actuation. We note that the analog output, projected beam detector placed in the corridor (Figure 2) provided a measurable response in all tests.

As indicated above, results within the guest room were similar for Tests 1 to 4. Some key results will now be reported for Test 1. In Figure 10, gas temperature over the chair at an elevation of 90 in. (see Figure 3) and at the 5 ft level in the center of the room are shown along with the ceiling surface temperature in Test 1. In this test, both the ECHS sprinkler and the pendent sprinkler in the foyer (Figure 2) actuated at 267 s. (The pendent sprinkler in the bathroom did not actuate in this test nor in any other of the 12 tests.) At 267 s, the gas temperature over the chair achieved its maximum of 1456°F. At the same time the gas temperature reached a maximum of 226°F at the 5 ft level in the center of the room. With sprinkler actuation, gas temperature throughout the room decreased rapidly. A maximum temperature of 178°F was achieved at the ceiling surface near the chair 5 sec after sprinkler actuation.

Figure 11 shows gas temperatures at various locations in the guest room and corridor at the 5 ft level. Maxima at the center of the room, center of foyer, outside the guest room door and at the end of the hall were all achieved approximately at the same time as sprinkler actuation. These maxima were 226°F, 146°F, 150°F, and 89°F, respectively. The period of time for which the gas temperature was above 200°F in the center of the room was less than 15 s. Gas temperatures clearly would decrease as an occupant approaches the guest room door and exits into the corridor. Furthermore, early alert by smoke detectors would decrease the chances of health impairment due to high gas temperatures. In this test, the smoke detectors in the guest room responded to the fire in a time period varying from 39 to 180 s after ignition. Gas temperatures at the 5 ft level were less than 100°F at these times. (Smoke detector and sprinkler response times for all tests are given in Appendix A. The sensitivities of the detectors in terms of obscuration per foot as provided by NEMA are also listed in Appendix A. Locations of the detectors and sprinklers are shown in Figure 2.) Note that with the door open, the detectors in the corridor responded 12 to 29 s before sprinkler actuation (Appendix A).

In Figure 12, carbon monoxide gas concentration are shown from the four gas sampling location shown in Figure 5: center guest room ceiling; 5 ft level center guest room, 5 ft level center foyer; 5 ft level end of corridor. Results shown in Figure 12 have not been corrected for the lag time due to sampling (approximately 40 s) or instrument response time. A peak

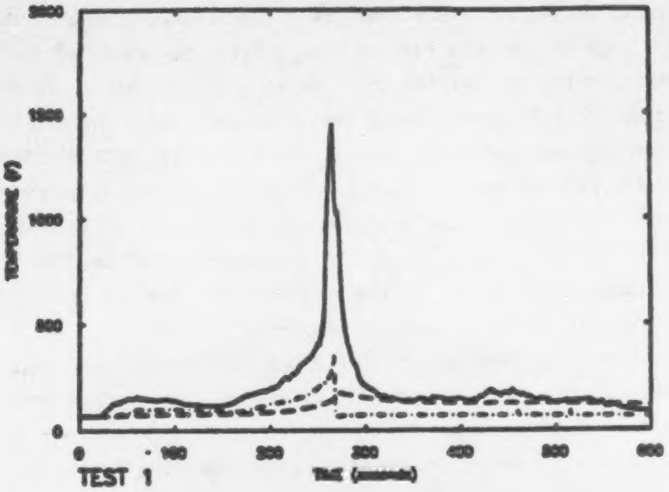


Figure 10. Gas Temperatures: Over Ignition, ___; 5 ft at Center of Room, ___.___; and Ceiling Surface Temperature, ___ ___.

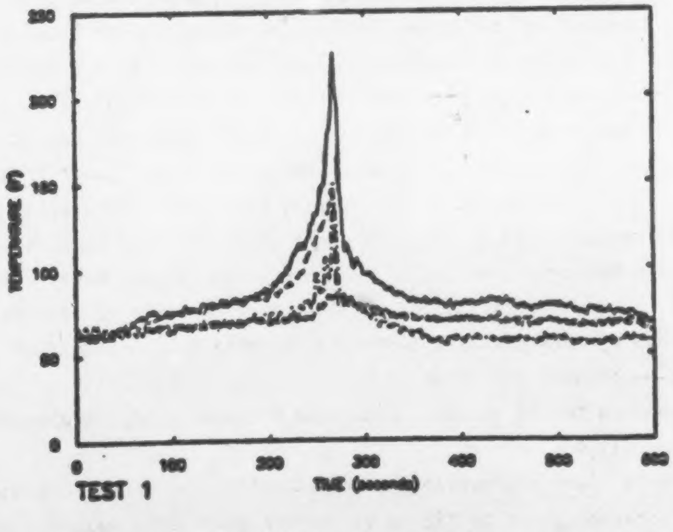


Figure 11. Gas Temperature at 5 ft: Center of Room, ___; Foyer, ___ ___ ___; Outside Door, ___.___; End of Corridor, ___ _ ___.

concentration of 2254 ppm occurred at the ceiling, near the time of sprinkler actuation. Lower peaks occurred at the other 5 ft locations mentioned in the guest room. After sprinkler actuation, carbon monoxide concentration was highest at the 5 ft level in the center of the guest room, presumably due to mixing and cooling of gases by the sprinkler. Using a criterion of 43,000 ppm-min for a 30 minute period, the maximum constant concentration which could be maintained was 1433 ppm. From Figure 11, it is clear that the time integrated carbon monoxide levels are well below 43,000 ppm-min. With the door open, carbon monoxide concentration levels fell at all locations after sprinkler actuation. The concentration levels would decrease as an occupant approaches the guest room door and exits into the corridor. The maximum concentration in the corridor was only 237 ppm.

Figures 13 and 14 show, respectively, the oxygen and carbon dioxide concentration levels for Test 1 (see Figure 5 for instrumentation locations). Oxygen concentration levels were never less than 18% at the 5 ft level in the room and were only slightly decreased from initial conditions in the corridor. The maximum carbon dioxide concentration at the 5 ft level in the center of the guest room was 1.8%. As indicated by the criteria of Newman and Khan(26) Table I, Section 1.3, oxygen and carbon dioxide levels were not a threat to life in Test 1.

Obscuration measurements are shown at the ceiling and 5 ft level in the center of the guest room and outside the door in the corridor for all tests in Appendix B. Obscuration levels are reported for a 1 ft pathlength for a wavelength of 0.555 microns, the peak in sensitivity of the human eye(44). The actual wavelength detected by the obscuration meters at all locations other than at the 5 ft level in the center of the guest room was 0.4579 microns (infrared). At the 5 ft level in the center of the room the wavelength was 0.94 microns. The data has been corrected to 0.555 microns using the method reported by Newman and Steciak(39). (This correction technique is discussed in Appendix C, and data are reported from the present study indicating the validity of the correction.)

In Figure B.1, it is evident that obscuration approaches 100% in the room at the time of sprinkler actuation (267 s). (Note that due to the electronics, the commercial obscuration meter at the 5 ft level in the center of the room saturated at slightly below 90% obscuration.) A review of smoke detector

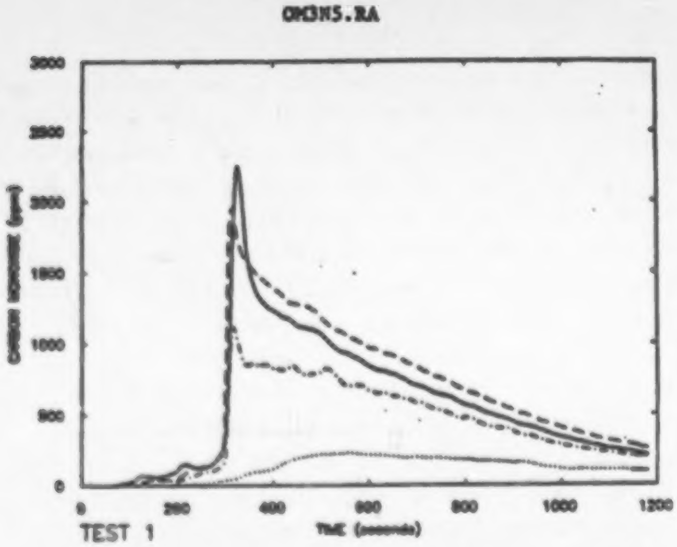


Figure 12. Carbon Monoxide Concentration: Room Center at the Ceiling, ___; Room Center at 5 ft, ___ ___ ___; Foyer, ___.___; End of Corridor, ...

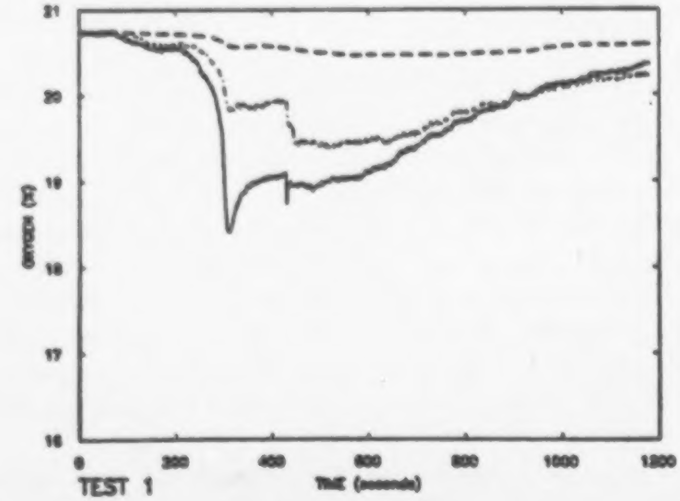


Figure 13. Oxygen Concentration at the 5 ft Level: Center of Room, ___; Foyer, ___.___; End of Corridor, ___ ___.

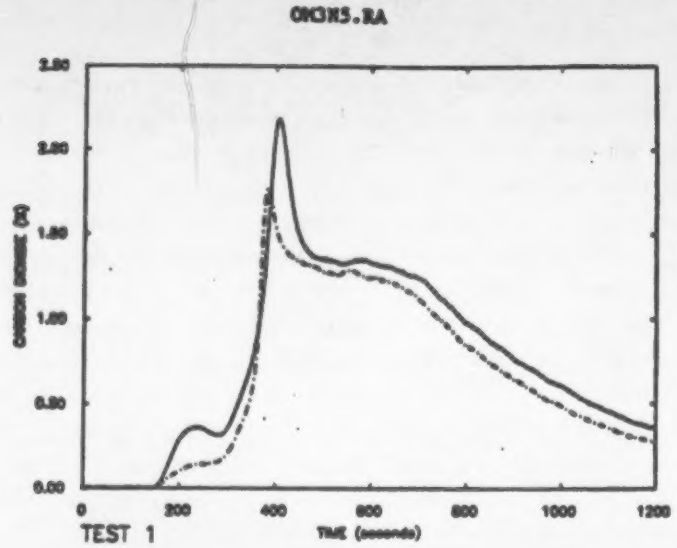


Figure 14. Carbon Dioxide Concentration in the Center of the Room: At the Ceiling, ___; 5 ft, ___.___.

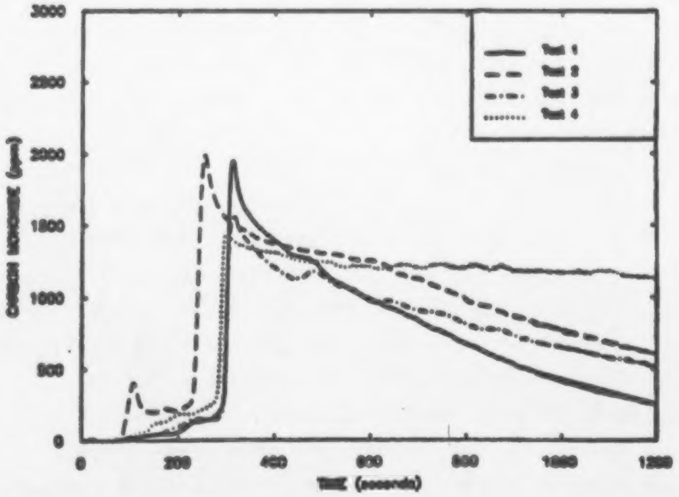


Figure 15. Carbon Monoxide Concentration at 5 ft in the Room Center for Four Tests.

response times listed for Test 1 in Appendix A indicates that even for the slowest responding smoke detector, obscuration at the 5 ft level did not exceed 15% at the time of response. An occupant alerted by the smoke detectors could easily leave the guest room. By the time of sprinkler actuation, an occupant would have a more difficult time escaping. Because survivability criteria were maintained by the sprinkler, an occupant failing to escape could still be rescued more than 30 minutes after fire initiation.

Obscuration results are also shown in Figure B.1 at two levels outside the guest room door. The obscuration levels peak approximately at the time of sprinkler actuation. The effect of ventilation in the corridor was to prevent any significant smoke concentration from occurring in the corridor prior to the occurrence of rapid fire growth. Obscuration measured at the end of the corridor at the ceiling (not shown in Appendix B) was essentially the same as that measured outside the door at the ceiling in all 12 tests.

Because the fire was suppressed by the sprinkler and the corridor was ventilated, smoke concentration in the corridor decreased after sprinkler actuation. Furthermore, the reduction in buoyancy of the gases after sprinkler operation resulted in higher obscuration levels at the 5 ft level compared to the ceiling. (The effect of reduced buoyancy was also observed in a marked decrease in the enthalpy flux flowing through the room return stack.) Noting that in Table I, obscuration tenability limits over a 1 ft pathlength ranged from 6 to 29%, we conclude that obscuration levels remained reasonable in the corridor throughout the test.

Key results from Test 1 and all other flaming-started tests are summarized in Table VIII. The table indicates gas temperature maxima at five, 5 ft locations, the maximum ceiling surface temperature near ignition, and carbon monoxide and carbon dioxide concentration maxima at the 5 ft level in the center of the room. Response times for sprinklers and smoke detectors are summarized for all flaming-started fire tests in Table IX. In all four chair tests (Tests 1 to 4), flaming was first initiated in the waste-paper basket at the side of the chair. Flaming combustion did not occur on the side of the chair until the paper in the basket was nearly consumed and the flame height had subsided to the top of the basket. In Test 2 it was necessary to use three different chairs before combustion was successfully sustained in the chair. In that test, unlike any of the other flaming tests, considerable

TABLE VIII
SUMMARY OF RESULTS FOR FLAMING-STARTED FIRE TESTS

	Temperatures						Gas Concentration	
Test No.	$T_{ceiling}$ (°F)	T_{center} (°F)	T_{foyer} (°F)	T_{bath} (°F)	T_{door} (°F)	$T_{corridor}$ (°F)	CO (ppm)	CO_2 (%)
1	178	226	146	105	150	84	1953	1.8
2	203	207	189	107	68	70	1989	1.5
3	171	213	160	105	127	81	1576	1.5
4	170	197	195	118	72	74	1431	1.6
5	182	195	159	116	145	92	1357	1.3
6	186	200	188	131	68	69	1701	1.3
7	180	250	206	131	138	93	2426	2.1
8	193	226	203	136	73	74	1143	1.6

↑

TABLE IX

SUMMARY OF SMOKE DETECTOR AND SPRINKLER RESPONSE TIME FOR FLAMING-STARTED FIRE TESTS

Test #	Guest Room Smoke Detector Response Time(s)	Corridor Smoke Detector Response Time(s)	ECHS Response Time(s)	Foyer Sprinkler Response Time(s)
1	36-180	238-255	267	267
2	29-57	455-562[a]	256	no operation
3	32-182	221-249	258	256
4	24-34	no response	248	245
5	27-88	143-176	235	233
6	20-57	624-784[a]	262	no operation
7	22-61	106-195	175	169
8	29-153	no response	197	192

[*] The pendent sprinkler in the bathroom did not actuate in any test.

[a] Two detectors did not respond.

smoke appeared from the waste-paper basket before flaming occurred. This is evident in Figure B.2 in which a peak in obscuration occurs at approximately 25 s at the ceiling level. This may have occurred due to a slightly denser packing of the newspapers or perhaps due to slightly damp newspaper. After initiation of flaming combustion on the side of the chair, the flame spread up the side to the top of the chair and then ignited the curtains. The curtains were completely consumed in all four fire tests; however, sprinkler actuation suppressed the fire in the chair before more than half of the fabric of the chair was involved. The maximum ceiling surface temperature varied from 178°F to 203°F while the gas temperature maxima at the 5 ft level varied from 197°F to 226°F. The gas temperature never exceeded 200°F for more than 15 s. Corridor conditions obviously varied depending upon whether the door was open (odd numbered tests) or closed (even numbered tests). In tests with the door closed, corridor gas temperatures remained essentially at the initial temperature and smoke obscuration was never more than 5%/ft. In contrast, with the door open, the gas temperature at the 5 ft level outside the doorway (Figure 11) was as high as 150°F, although the gas temperature at the 5 ft level decreased to below 93°F at the end of the corridor. Obscuration results within the corridor were similar in Tests 1 and 3 (see Figures B.1 and B.3).

Ventilation conditions and the disposition of the guest room door were observed to have an effect upon the carbon monoxide concentration levels in the guest room. Figure 15 compares carbon monoxide concentrations at the 5 ft level in the center of the room from Tests 1 to 4. A clear effect of maintaining the door open in Tests 1 and 3 was the reduction in carbon monoxide concentration levels after sprinkler actuation compared to Tests 2 and 4. Concentrations in Test 1 were less than those in Test 3, probably due to the effect of fresh air supplied through the room register. In Test 2 with the door closed, carbon monoxide still decreased as combustion products were vented through the bathroom exhaust and the passive return. In Test 4 in which the room door was closed and no ventilation was supplied to the guest room, carbon monoxide levels remain practically fixed throughout the test at a level of approximately 1100 ppm. At this level the 43,000 ppm-min limit would be achieved in 39 minutes.

Reviewing the data in Table VIII for Tests 1 to 4, we note that peak carbon monoxide levels are associated with the two fully ventilated tests, while in Tests 3 and 4 with only corridor ventilation, carbon monoxide concentration maxima are respectively 21% and 28% lower than the peak of Test 2. This may possibly be due to increased fire intensity caused by ventilation of the fire. With only four similar chair tests, a firm conclusion cannot be drawn.

4.2 FLAMING-STARTED BED TESTS

Sprinkler and detection performance in the flaming-started bed tests (Tests 5 to 8) was similar to that observed in the flaming-started chair tests. The fire was suppressed in all four tests, survivability within the guest room was maintained for at least 30 minutes in all four tests except Test 7 in which the carbon monoxide criterion was exceeded after 25 min, 45 s. Again detectors would provide advantages for escaping occupants. Data from the two test scenarios shown in Table VIII indicates the similarity of the eight tests. Sprinkler and smoke detector response time are summarized in Table IX. Note that in Test 7, the maximum gas temperature at the 5 ft level in the center of the room reached 250°F. However, the temperature was above 200°F for less than 20 s.

The most significant differences between the two test scenarios are related to the geometries of the fire source and the degree of fire suppression. In contrast to the chair and drape scenario in which fire spread vertically up the side of the chair and drapes, the bed scenarios provided only a horizontal surface, resulting in relatively slow fire spread and low flame heights. As a result, gas temperatures at the ceiling over ignition rose more gradually. In addition no sharp peak in carbon monoxide concentration was observed near the time of sprinkler actuation in the bed tests, in contrast to the chair tests. At the end of the fire tests, a visual inspection of the bed showed that while the fire was extinguished on the surface of the bed, smoldering and small flamelets were observed in the box spring. Apparently the bedding materials and top mattress provide some shielding for the fire from sprinkler spray. This contrasts with the chair tests in which the fire was extinguished in the chair, and the drapes were completely consumed.

Results from Test 5 are typical of the bed tests. In Figure 16, gas temperature results, are shown near the ceiling at a location on the west wall over ignition, at the 5 ft level in the center of the room and at ceiling surface over the bed. The ECHS sprinkler actuated at 235 s in this test. Smoke detectors in the room responded between 27 and 75 s after ignition while corridor detectors responded between 143 and 176 s after ignition. Gas temperature results at four 5 ft locations, similar to those shown in Figure 11 (Test 1), are shown in Figure 17. As in Test 1, a decrease in gas temperature would occur as an occupant approaches the doorway and exits into the corridor. Similar results were observed in Tests 5 to 8.

Carbon monoxide concentration levels at the 5 ft level in the center of the room are shown in Figure 18 for Tests 5 to 8. Unfortunately, in Test 5, data acquisition was halted before a decrease in carbon monoxide concentration was observed. However, the carbon monoxide concentration levels in Test 5 are comparable to those of Tests 6 and 8. In Tests 5, 6, and 8, the time integrated carbon monoxide level are well below the limit of 43,000 ppm-min. The peak carbon monoxide concentration levels occurred in Test 7. After Test 7, it was noted that the door from the HUD building to the hotel corridor was not fully open. (In all other tests, the door to the hotel corridor was fully open.) This may in part account for the high levels of carbon monoxide as well as the high levels of obscuration in the corridor (see Figure B.7). Despite this, the carbon monoxide limit was only exceeded 25 min 45 s after ignition. The maximum time integrated value for the entire test achieved was just 10.5% higher than the limit of 43,000 ppm-min.

The effect of ventilation on carbon monoxide production is not clear in these tests. Observation of fire spread in these tests suggests that the particular level achieved was a function of the fire history in each test. We note that in the bed tests, fire spread was less repeatable than in the chair tests. In some of the bed tests, the fire spread primarily across the head of the bed near the pillows, while in others the spread was towards the side. Thus the particular level of carbon monoxide produced in Tests 5, 6, and 8 was probably more related to the individual fire histories of the tests than to ventilation conditions. Nevertheless, in Tests 5 to 8, we note that the minimum carbon monoxide was produced in the test with the least ventilation, Test 8. This is consistent with the results of Test 1 to 4.

Obscuration data at the 5 ft level in the guest room and corridor for Tests 5 to 8 are reported in Appendix B. Sprinkler and detector response

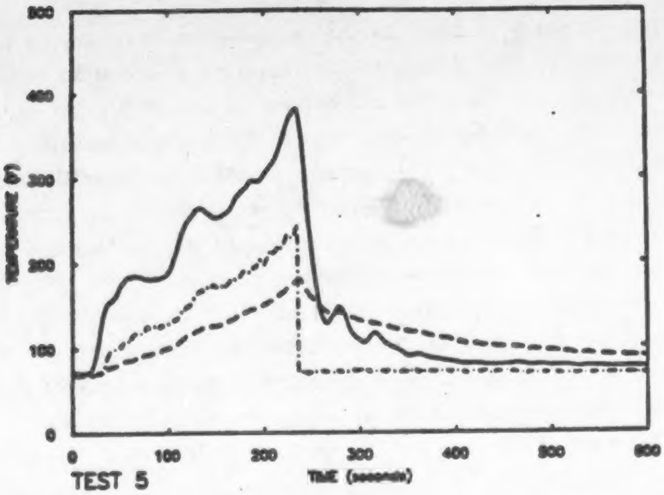


Figure 16. Gas Temperatures: Over Ignition, ___; 5 ft at Center of Room, ___.___; and Ceiling Surface Temperature, ___ ___.

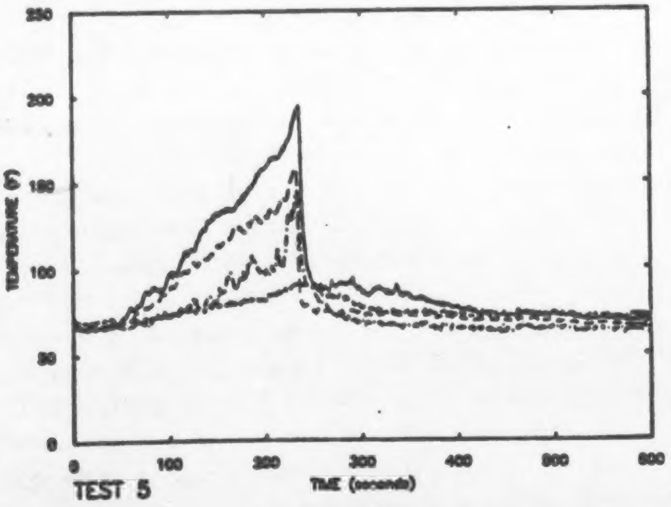


Figure 17. Gas Temperatures at 5 ft: Center of Room, ___; Foyer, ___ ___ ___; Outside Door, ___.___; End of Corridor, ___ _ ___.

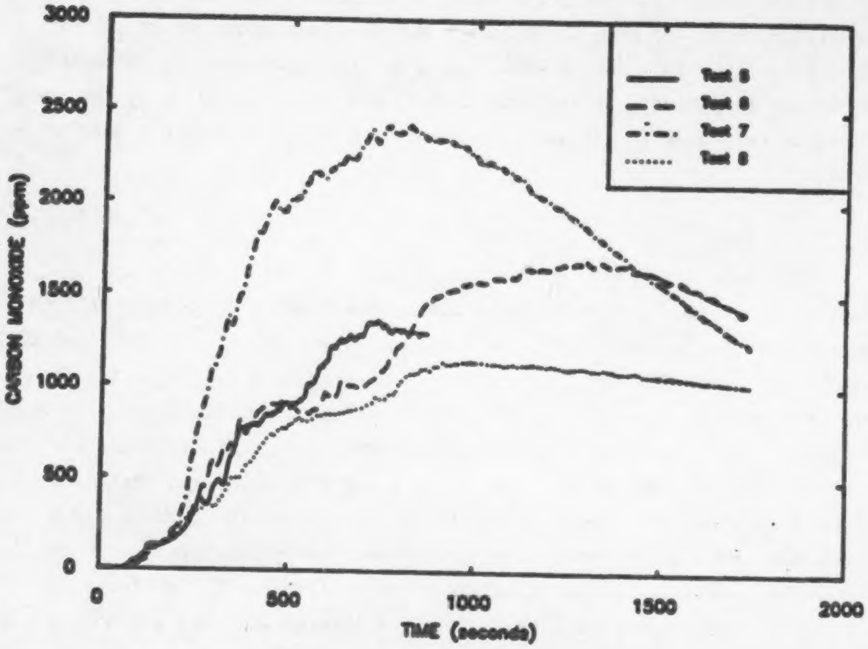


Figure 18. Carbon Monoxide at 5 ft in the Room Center for Four Tests.

times which are reported in Appendix A, indicate that as in Tests 1 to 4, detectors respond while obscuration/ft is less than 15% and that obscuration approaches 100% at the time of sprinkler actuation. The minimum warning time provided by the smoke detectors before sprinkler actuation in Tests 5 to 8 was 39 s.

Corridor detectors responded in a similar fashion to those in the chair fire tests except in Test 7 (corridor ventilation only, door open) in which detectors responded from 163 s before sprinkler actuation to 26 s after sprinkler actuation, unlike Test 3 in which all detectors responded before sprinkler actuation. As in Tests 1 to 4, the analog output projected beam detector responded in all tests whether the guest room door was open or closed.

4.3 SMOLDERING-STARTED FIRE TESTS

Four smoldering-started tests were conducted as discussed in Section 3.1. In all four of these tests, the flaming fires eventually created were suppressed and survivability limits were maintained. In only one of the four tests, Test 12, did transition to a flaming mode spontaneously occur. In the other three tests flaming conditions were artificially created 52 minutes into the test by placing a lit match near the location of the immersion heater used to initiate smoldering. The primary difference between Tests 9 to 12 and Tests 5 to 7 was in a longer incipient period before fire growth and a resultant increase in the time period between detector response and sprinkler actuation. However, carbon monoxide concentrations were significantly lower in the smoldering-started fire tests. The reasons for this are unclear, but would seem to be related to the substantial differences in modes of combustion between the smoldering-started and flaming-started fire tests.

Results from all smoldering-started tests are summarized in Table X. The table indicates gas temperature maxima at five 5-ft locations, maximum ceiling surface temperature near ignition, and carbon monoxide and carbon dioxide concentration maxima at the ceiling in the center of the room. (See Figures 4 and 5 for instrumentation locations.) Results for specific detector and sprinkler response times and obscuration are given in Appendices A and B, respectively. A summary of response times is given in Table XI.

TABLE X

SUMMARY OF RESULTS FOR SMOLDERING-STARTED FIRE TESTS

	Temperatures						Gas Concentration	
Test No.	$T_{ceiling}$ (°F)	T_{center} (°F)	T_{foyer} (°F)	T_{bath} (°F)	T_{door} (°F)	$T_{corridor}$ (°F)	CO (ppm)	CO_2 (%)
9	218	203	134	98	94	74	412	1.1
10	200	215	204	135	79	81	952	1.3
11	199	223	188	127	129	93	1161	1.5
12	225	232	202	126	75	77	510	1.3

TABLE XI

SUMMARY OF SMOKE DETECTOR AND SPRINKLER RESPONSE TIMES FOR SMOLDERING-STARTED FIRE TESTS[*]

Test #	Guest Room Smoke Detector Response Time(min)	Corridor Smoke Detector Response Time(min)	ECHS Response Time(min)	Foyer Sprinkler Response Time(min)
9	23.28-52.72	53.58-53.72	54.12	54.02
10	18.53-52.85	63.32-64.75[a]	56.93	56.85
11	4.38-19.63	53.60-53.97	55.28	54.98
12	12.02-18.07	no response	20.28	20.13

[*] The pendent sprinkler in the bathroom did not actuate in any test.

[a] Three smoke detectors did not respond.

4.4 SIMULATED SPRINKLER LINK RESULTS

Brass discs with an RTI of 51 $(ft\text{-}s)^{1/2}$ were installed to simulate the thermal response of sprinklers at locations within the guest room and corridor. The locations of these discs are shown in Figures 3 and 4. It is assumed that a sprinkler would actuate at the time that these discs reached the same temperature as that achieved by the disc closest to the ECHS sprinkler (see detail in Figure 3). (We note that the brass spheres within the guest room indicated gas speeds at the location of the brass discs to be comparable to gas speeds near the extended coverage sprinkler.)

One disc shown in the detail in Figure 3 is located 2 in. down and 8 in. over from the ECHS sprinkler. Since the temperature data for this disc was virtually the same as that of the disc closest to the ECHS sprinkler, sprinkler response at both disc locations would be similar to that of the installed ECHS sprinkler.

Disc locations on the north and south walls of the guest room represent two other possible sprinkler installations (Figure 3). Using two sidewall sprinklers in either of these locations would not require ECHS sprinklers. With piping available from the bathroom, the simplest installation of two standard sidewall sprinklers would be along the north wall. Sprinkler response time would obviously be reduced (for sprinklers with the same sensitivity as those used in this study) due to the decreased distance of fire source from the sprinkler. The discs indicate that for fires such as the chair fires of Test 1 to 4, sprinkler response time would be reduced by about 15 s. In the case of a bed fire, the discs indicate that response time would be reduced by 75 to 120 s. With gas temperatures at the 5 ft level exceeding 200°F in our tests, even a 15 s reduction in response time would significantly reduce health risks.

Brass discs within the corridor indicate that with sprinklers installed as in this test program, no sprinklers with an RTI of 51 $(ft\text{-}s)^{1/2}$ or greater would have actuated due to fires of Tests 1 to 12. Cooling of hot gases by the extended coverage sprinkler and the pendent sprinkler in the foyer would prevent actuation even when the guest room door is open.

V
CONCLUSIONS

The extended coverage, horizontal sidewall sprinkler equipped with a fast-response link suppressed the fire in all twelve tests in this study. Survivability criteria based upon eye-level (5 ft) gas temperature and time-integrated carbon monoxide concentration levels within the guest room were satisfied. No more than two sprinklers actuated within the guest room under the ventilation conditions of this study, i.e., the extended coverage, sidewall sprinkler and pendent sprinkler in the foyer. Smoke detectors in the guest room responded 39 s or more before sprinkler actuation. All smoke detectors in the guest room responded in all tests. With gas temperatures at the 5 ft level within the guest room being between 200 to 250°F for up to 20 s, and obscuration approaching 100% at the time of sprinkler actuation, advance warning by smoke detectors would decrease risks to health and improve chances for escape. Other than effects within the corridor due to the disposition of the guest room door, ventilation was not a key factor in this study. Air flow generated by the fire dominated air movement produced by the ventilation system. With the guest room door closed, the corridor remained virtually free of heat and smoke. The response of smoke detectors in the corridor was, however, significantly affected by ventilation. With the door closed and only ventilation in the corridor, no detector responded in the corridor. All detectors in the corridor responded if the guest room door was open. The response of the smoke detectors indicated that detector sensitivities at the less sensitive end of the production window is adequate for the fire scenarios and occupancy of this study.

VI
RECOMMENDATIONS

Data from this test program indicate that extended coverage, horizontal sidewall sprinklers with the thermal sensitivity and temperature rating of the sprinkler used in this study can provide hotels with a means of suppressing fires in guest rooms while satisfying the test program survivability criteria for occupants not in intimate contact with the fire within the guest room. However, high gas temperatures observed during fire tests suggest that similar extended coverage sidewall sprinklers with slower response times or lower water application densities might decrease the potential for survivability of occupants. In order to understand the limits of these sprinklers, a systematic study of the effect of using lower sensitivity links and of decreasing water application densities should be undertaken with the goal of developing approval standards for extended coverage, horizontal sidewall sprinklers equipped with fast-response links for this type of occupancy.

The advanced warning given by smoke detectors in the guest room in flaming-started fire tests indicates that installation of both sprinkler and detector systems in hotel guest rooms and corridors should be recommended. Results for smoke detectors in the only smoldering-started fire test in which flaming conditions occurred spontaneously after smoldering combustion had been initiated indicate significant advance warning is also provided. Further tests which realistically simulate smoldering-started fires should be undertaken to determine the performance of sprinklers and detectors under such situations.

Finally, only fire scenarios in a guest room have been explored in this study. The fire record in hotels indicates that the performance of sprinklers and smoke detectors in atria, assembly areas, and similar large areas should also be studied.

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APPENDIX A
SMOKE DETECTOR AND SPRINKLER RESPONSE TIMES

TEST NO. 1. FLAMING CHAIR, FULL VENTILATION, DOOR OPEN

Detector No.	Smoke Detectors	Time (s)	Sensitivity (%/ft)
1	Light Scattering A	164	3.11
2	Light Scattering B	163	2.98
3	Ionization	39	0.81
4	Light Scattering A	174	3.11
5	Light Scattering B	180	3.15
6	Ionization	53	1.12
7	Light Scattering A	56	2.99
8	Light Scattering B	55	2.90
9	Ionization	36	0.92
10	Light Scattering A	250	2.97
11	Light Scattering B	247	3.15
12	Ionization	238	0.96
13	Light Scattering A	250	3.20
14	Light Scattering B	255	4.30
15	Ionization	250	1.23
	Sprinklers		
16	Sidewall	267	-
17	Entry	267	-
18	Bathroom	-	-

TEST NO. 2. FLAMING CHAIR, FULL VENTILATION ONLY, DOOR CLOSED

Detector No.	Smoke Detectors	Time (s)	Sensitivity (%/ft)
1	Light Scattering A	33	2.97
2	Light Scattering B	33	2.87
3	Ionization	48	1.33
4	Light Scattering A	47	3.22
5	Light Scattering B	52	2.87
6	Ionization	57	1.06
7	Light Scattering A	33	3.04
8	Light Scattering B	29	4.13
9	Ionization	30	1.00
10	Light Scattering A	562	3.02
11	Light Scattering B	470	2.65
12	Ionization	-	1.12
13	Light Scattering A	518	3.15
14	Light Scattering B	455	3.04
15	Ionization	-	0.92
	Sprinklers		
16	Sidewall	256	-
17	Entry	-	-
18	Bathroom	-	-

TEST NO. 3. FLAMING CHAIR, CORRIDOR VENTILATION ONLY, DOOR OPEN

Detector No.	Smoke Detectors	Time (s)	Sensitivity (%/ft)
1	Light Scattering A	142	3.09
2	Light Scattering B	85	3.27
3	Ionization	41	0.86
4	Light Scattering A	182	3.11
5	Light Scattering B	126	1.23
6	Ionization	42	3.21
7	Light Scattering A	179	2.93
8	Light Scattering B	126	3.20
9	Ionization	32	1.12
10	Light Scattering A	248	3.06
11	Light Scattering B	249	3.50
12	Ionization	231	1.23
13	Light Scattering A	234	2.75
14	Light Scattering B	221	3.14
15	Ionization	222	1.23
	Sprinklers		
16	Sidewall	258	-
17	Entry	256	-
18	Bathroom	-	-

TEST NO. 4. FLAMING CHAIR, CORRIDOR VENTILATION ONLY, DOOR CLOSED

Detector No.	Smoke Detectors	Time (s)	Sensitivity (%/ft)
1	Light Scattering A	28	3.11
2	Light Scattering B	30	2.91
3	Ionization	32	1.00
4	Light Scattering A	33	2.93
5	Light Scattering B	33	2.89
6	Ionization	34	1.00
7	Light Scattering A	25	3.04
8	Light Scattering B	24	3.18
9	Ionization	25	1.28
10	Light Scattering A	-	3.18
11	Light Scattering B	-	2.65
12	Ionization	-	1.12
13	Light Scattering A	-	3.02
14	Light Scattering B	-	2.61
15	Ionization	-	1.00
	Sprinklers		
16	Sidewall	248	-
17	Entry	245	-
18	Bathroom	-	-

TEST NO. 5. FLAMING BED, FULL VENTILATION, DOOR OPEN

Detector No.	Smoke Detectors	Time (s)	Sensitivity (%/ft)
1	Light Scattering A	27	2.79
2	Light Scattering B	27	3.10
3	Ionization	29	1.23
4	Light Scattering A	88	2.84
5	Light Scattering B	35	3.00
6	Ionization	38	1.12
7	Light Scattering A	27	2.81
8	Light Scattering B	75	2.88
9	Ionization	28	0.81
10	Light Scattering A	167	3.22
11	Light Scattering B	162	2.50
12	Ionization	143	1.23
13	Light Scattering A	176	3.45
14	Light Scattering B	160	3.40
15	Ionization	144	1.12
	Sprinklers		
16	Sidewall	235	-
17	Entry	233	-
18	Bathroom	-	-

TEST NO. 6. FLAMING BED, FULL VENTILATION, DOOR CLOSED

Detector No.	Smoke Detectors	Time (s)	Sensitivity (%/ft)
1	Light Scattering A	49	3.18
2	Light Scattering B	45	2.50
3	Ionization	20	1.28
4	Light Scattering A	57	2.97
5	Light Scattering B	56	2.75
6	Ionization	32	0.96
7	Light Scattering A	52	3.22
8	Light Scattering B	48	4.20
9	Ionization	18	1.00
10	Light Scattering A	784	3.02
11	Light Scattering B	649	2.65
12	Ionization	-	1.12
13	Light Scattering A	749	3.15
14	Light Scattering B	624	3.04
15	Ionization	-	0.92
	Sprinklers		
16	Sidewall	262	-
17	Entry	-	-
18	Bathroom	-	-

TEST NO. 7. FLAMING BED, CORRIDOR VENTILATION ONLY, DOOR OPEN

Detector No.	Smoke Detectors	Time (s)	Sensitivity (%/ft)
1	Light Scattering A	55	2.95
2	Light Scattering B	53	3.35
3	Ionization	22	1.06
4	Light Scattering A	61	3.02
5	Light Scattering B	60	3.20
6	Ionization	34	1.23
7	Light Scattering A	56	3.15
8	Light Scattering B	54	2.75
9	Ionization	25	1.23
10	Light Scattering A	119	3.02
11	Light Scattering B	118	2.65
12	Ionization	106	1.12
13	Light Scattering A	108	3.15
14	Light Scattering B	193	3.04
15	Ionization	195	0.92
	Sprinklers		
16	Sidewall	175	-
17	Entry	169	-
18	Bathroom	-	-

TEST NO. 8. FLAMING BED, CORRIDOR VENTILATION ONLY, DOOR CLOSED

Detector No.	Smoke Detectors	Time (s)	Sensitivity (%/ft)
1	Light Scattering A	82	3.09
2	Light Scattering B	73	2.48
3	Ionization	29	1.28
4	Light Scattering A	91	3.22
5	Light Scattering B	83	3.23
6	Ionization	43	1.06
7	Light Scattering A	85	3.18
8	Light Scattering B	153	3.36
9	Ionization	30	1.23
10	Light Scattering A	-	3.02
11	Light Scattering B	-	2.65
12	Ionization	-	1.12
13	Light Scattering A	-	3.15
14	Light Scattering B	-	3.04
15	Ionization	-	0.92
	Sprinklers		
16	Sidewall	197	-
17	Entry	192	-
18	Bathroom	-	-

TEST NO. 9. SMOLDERING BED, FULL VENTILATION, DOOR OPEN

Detector No.	Smoke Detectors	Time (min)	Sensitivity (%/ft)
1	Light Scattering A	28.35	3.15
2	Light Scattering B	23.32	3.15
3	Ionization	52.58	1.18
4	Light Scattering A	28.57	3.36
5	Light Scattering B	25.78	3.50
6	Ionization	52.72	1.23
7	Light Scattering A	23.52	2.61
8	Light Scattering B	23.28	3.14
9	Ionization	52.58	1.00
10	Light Scattering A	53.72	3.02
11	Light Scattering B	53.72	2.05
12	Ionization	53.58	1.12
13	Light Scattering A	53.65	3.15
14	Light Scattering B	53.63	3.04
15	Ionization	53.60	0.92
	Sprinklers		
16	Sidewall	54.12	-
17	Entry	54.02	-
18	Bathroom	-	-

TEST NO. 10. SMOLDERING BED, FULL VENTILATION, DOOR CLOSED

Detector No.	Smoke Detectors	Time (min)	Sensitivity (%/ft)
1	Light Scattering A	27.17	2.95
2	Light Scattering B	23.38	3.68
3	Ionization	52.63	0.81
4	Light Scattering A	18.53	2.95
5	Light Scattering B	20.20	3.66
6	Ionization	52.85	1.12
7	Light Scattering A	32.55	3.38
8	Light Scattering B	24.63	2.88
9	Ionization	52.58	1.18
10	Light Scattering A	64.75	2.97
11	Light Scattering B	63.32	2.79
12	Ionization	-	1.06
13	Light Scattering A	-	3.09
14	Light Scattering B	64.13	3.29
15	Ionization	-	1.18
	Sprinklers		
16	Sidewall	56.93	-
17	Entry	56.85	-
18	Bathroom	-	-

TEST NO. 11. SMOLDERING BED, CORRIDOR VENTILATION ONLY, DOOR OPEN

Detector No.	Smoke Detectors	Time (min)	Sensitivity (%/ft)
1	Light Scattering A	5.20	3.06
2	Light Scattering B	4.38	2.50
3	Ionization	12.63	1.12
4	Light Scattering A	10.58	3.31
5	Light Scattering B	11.95	3.10
6	Ionization	12.67	0.76
7	Light Scattering A	17.32	2.95
8	Light Scattering B	14.12	2.50
9	Ionization	19.63	1.06
10	Light Scattering A	53.77	3.11
11	Light Scattering B	53.60	3.05
12	Ionization	53.68	1.28
13	Light Scattering A	53.92	2.95
14	Light Scattering B	53.70	3.20
15	Ionization	53.97	1.23
	Sprinklers		
16	Sidewall	55.28	-
17	Entry	54.98	-
18	Bathroom	-	-

TEST NO. 12. SMOLDERING BED, CORRIDOR VENTILATION ONLY, DOOR CLOSED

Detector No.	Smoke Detectors	Time (min)	Sensitivity (%/ft)
1	Light Scattering A	12.80	3.02
2	Light Scattering B	12.38	3.50
3	Ionization	17.53	1.00
4	Light Scattering A	12.02	2.99
5	Light Scattering B	17.80	3.40
6	Ionization	18.07	1.28
7	Light Scattering A	17.57	2.97
8	Light Scattering B	12.28	3.25
9	Ionization	17.60	0.92
10	Light Scattering A	-	3.22
11	Light Scattering B	-	2.52
12	Ionization	-	1.23
13	Light Scattering A	-	3.45
14	Light Scattering B	-	3.35
15	Ionization	-	1.12
	Sprinklers		
16	Sidewall	20.28	-
17	Entry	20.13	-
18	Bathroom	-	-

APPENDIX B
OBSCURATION RESULTS FROM TESTS 1 TO 12

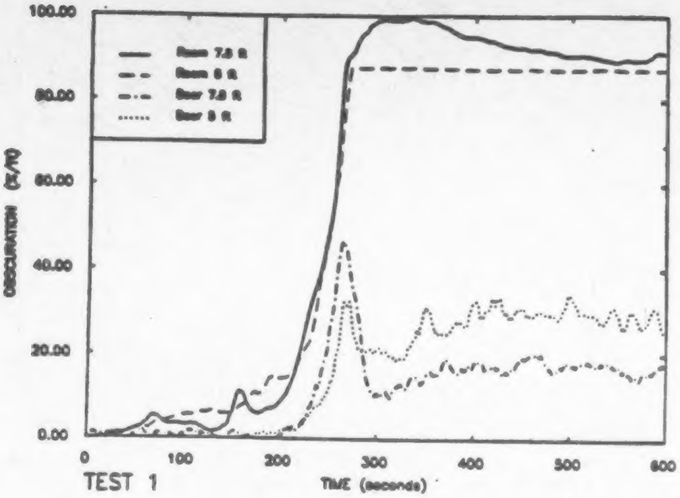

Figure B1. Obscuration for a 1 ft Pathlength at 0.555 microns.

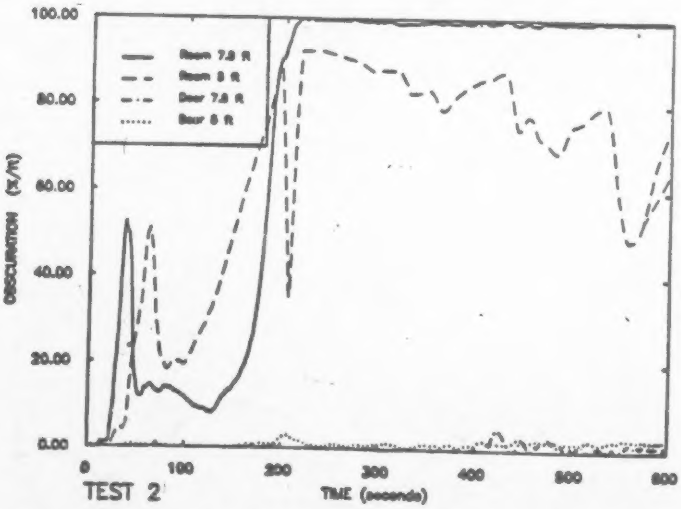

Figure B2. Obscuration for a 1 ft Pathlength at 0.555 microns.

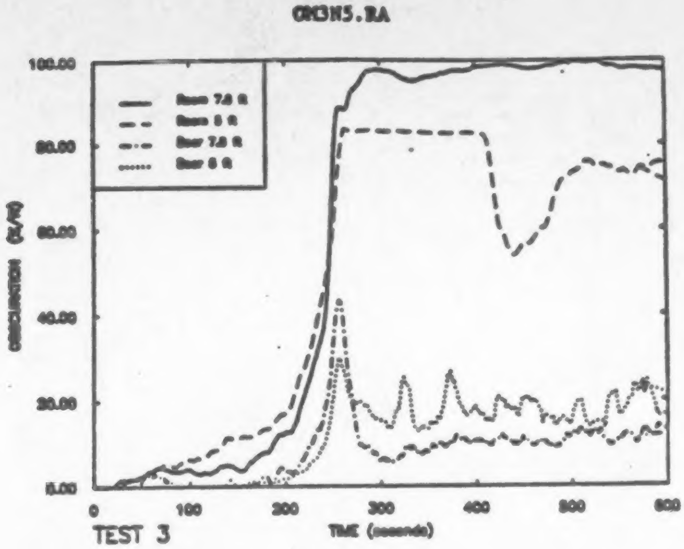

Figure B3. Obscuration for a 1 ft Pathlength at 0.555 microns.

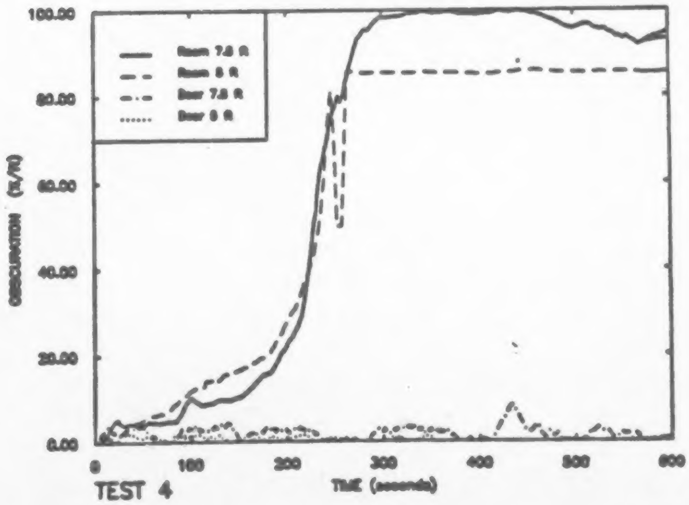

Figure B4. Obscuration for a 1 ft Pathlength at 0.555 microns.

OM3N5.RA

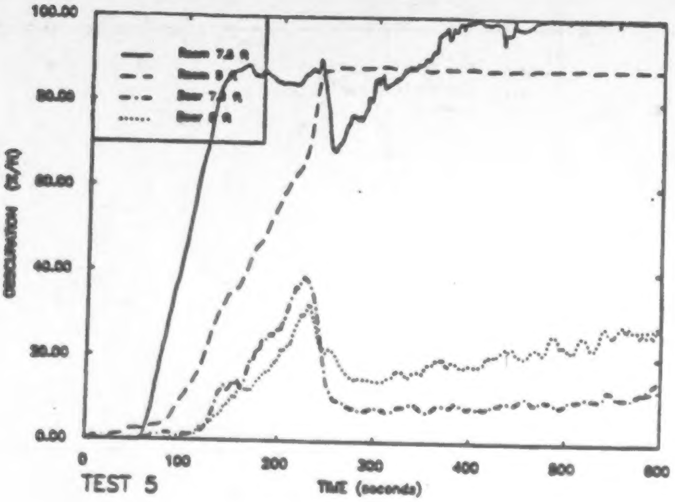

Figure B5. Obscuration for a 1 ft Pathlength at 0.555 microns.

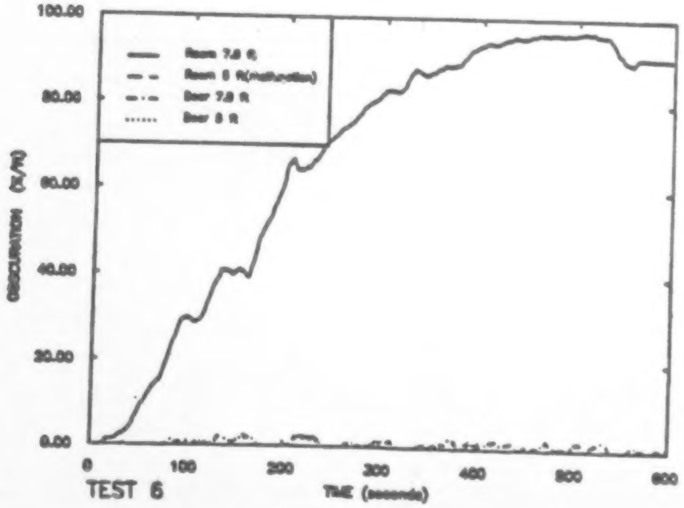

Figure B6. Obscuration for a 1 ft Pathlength at 0.555 microns.

OM3N5.RA

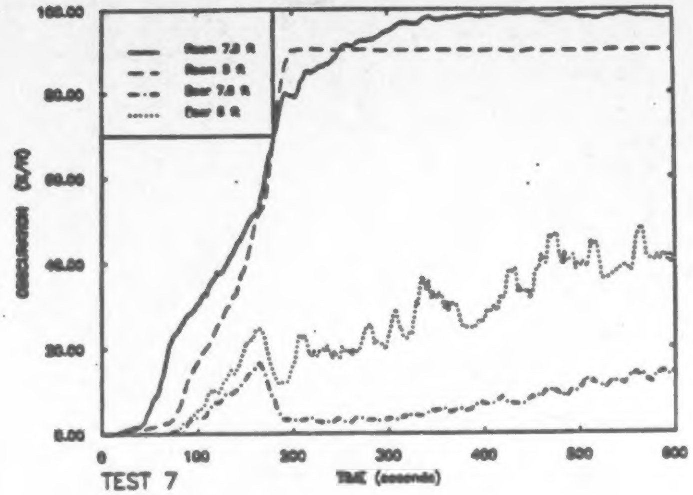

Figure B7. Obscuration for a 1 ft Pathlength at 0.555 microns.

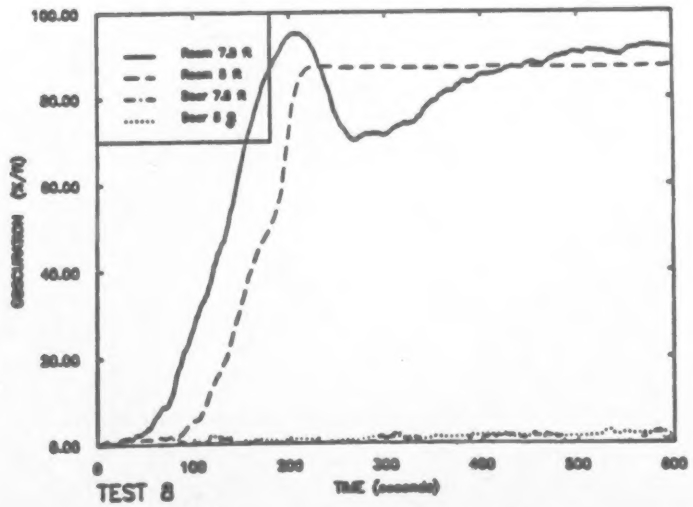

Figure B8. Obscuration for a 1 ft Pathlength at 0.555 microns.

OM3N5.RA

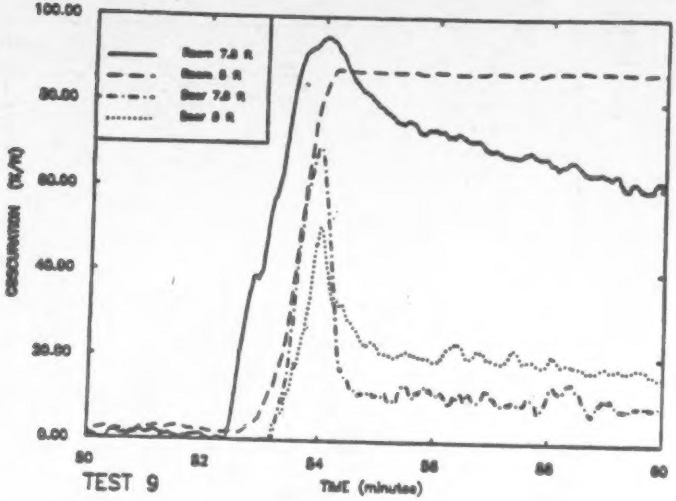

Figure B9. Obscuration for a 1 ft Pathlength at 0.555 microns.

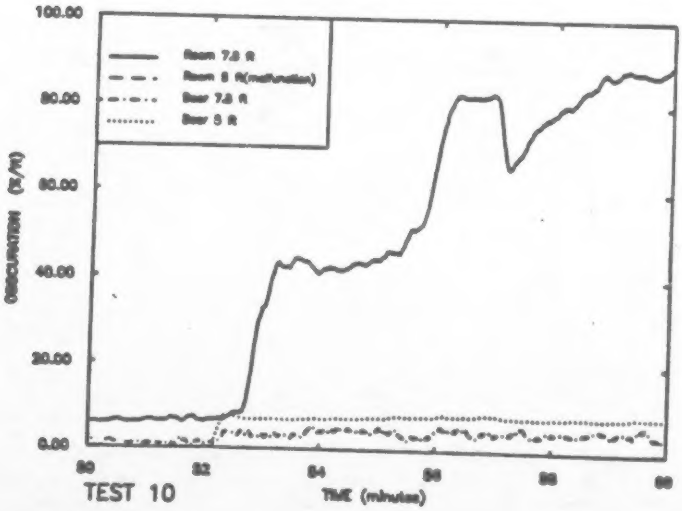

Figure B10. Obscuration for a 1 ft Pathlength at 0.555 microns.

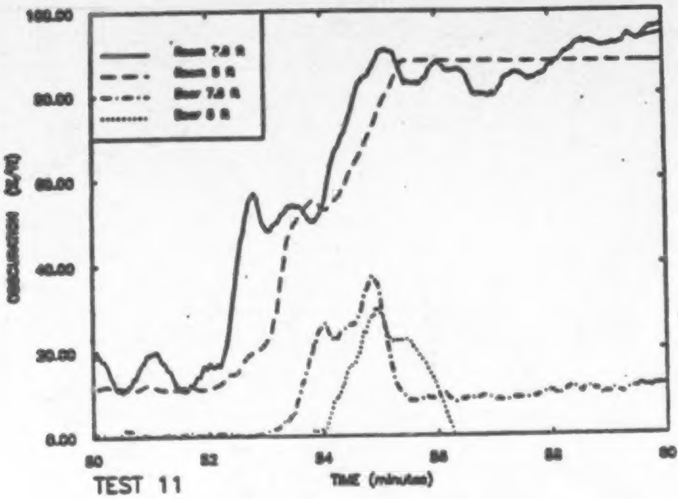

Figure B11. Obscuration for a 1 ft Pathlength at 0.555 microns.

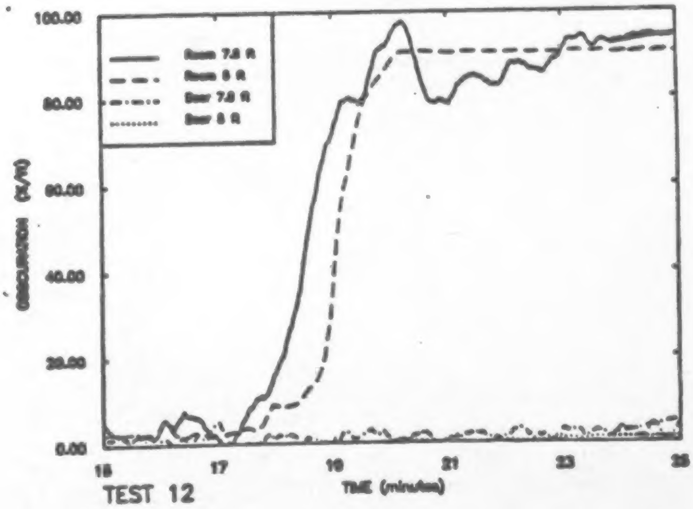

Figure B12. Obscuration for a 1 ft Pathlength at 0.555 microns.

Mr. **Boehlert**. Thank you very much, Mr. Reiss, and thank you, all the panel members.

Mr. Reiss, I do want you to know that smoke detectors have been part of this bill right from the beginning and will continue to be part, but could you outline for us in greater detail the differences in cost and performance between the system that you're recommending and the system that's called for in the bill?

Mr. **Reiss**. Well, what is in the bill really doesn't seem to be too clear. It seems to be, from our point of view, that there is a requirement for single station or room detectors that just give a notification within a room. It's basically a self-contained unit in all of the individual guest rooms. It is not clear that there is also this requirement for corridor and public area smoke detection, and that is what we are recommending be made very clear.

From a cost point of view, if you look at the entire system being installed at the same time, which is the sprinkler system, the fire alarm system, if it's not already there, together with any corridor smoke detectors and public area smoke detectors, we've looked at different costs involved in this, and we've gone outside of NEMA to fire marshals across the country as well as to people in the hotel/motel industry, and the costs, of course, of a sprinkler will vary, depending upon many variables in it.

But if you would say typically the cost of putting a sprinkler in on a retrofit, including all the patching and painting that goes to clean up the property, it's somewhere in the range of about $2.70 per square foot. Adding in the sprinkler supervision and the audible alarms, which have to be there to notify the occupants, or should be there for sure, will add about 30 percent to that, and that would be, in that case, about another 81 cents, bringing the cost to about $3.51. When you install the corridor and public area smoke detectors at the same time, you're talking about an incremental additional cost of only about 10 percent over that, so it's quite small; and, as you mentioned earlier, the hotel/motel industry has prepared a report on the coverage of both sprinklers and smoke detection systems, and the results from that indicate that a majority of hotels and motels already have corridor and public area smoke detection systems installed.

Mr. **Boehlert**. Thank you.

Chief Hilton and Mr. Nesbitt, I want to particularly, on behalf not only of myself but all the members who have cosponsored this legislation, thank you both very much for the chiefs and the fire fighters for being so enthusiastic in your support and for being missionaries for this cause.

Chief, I'd like to ask you one question. You talked about your travel policy that you have with the IAFC. Has that caused much inconvenience for your membership?

Mr. **Hilton**. No, sir.

Mr. **Boehlert**. How about the cost impact? Are you near bankruptcy now because of this safety—

Mr. **Hilton**. No, sir. I don't think that there's a great deal of cost impact at all. We're still within budget.

Mr. **Boehlert**. What's the reaction of the hotels you're dealing with? Particularly, you reported that you have just cancelled a conference at a facility that is not sprinklered. Did you let them know that that's the reason?

Mr. **Hilton**. Let me clarify that. We didn't cancel the contract with the hotel. The Division where the city was going to held—the city where the Division conference was going to be held had originally planned it in a non-sprinklered hotel, and he found out right fast that wasn't going to work. They had to cancel that project and start all over again.

Mr. **Boehlert**. Okay.

Mr. **Hilton**. The hotel industry that is sprinklered understands what we're doing. Those that are not sprinklered, those that are not protected, they understand also what we're doing. You'd be surprised at the positive reaction we get from some of those people, saying, "Hey, you know, it makes a lot of sense to us."

Mr. **Boehlert**. Well, that's been the experience that Chairman Walgren and I have encountered when we've talked to a number of people in the industry.

Mr. **Hilton**. Absolutely.

Mr. **Boehlert**. They're as enthusiastic about it as we are, and, I must confess, there are some others that are talking out of both sides of their mouth, but, by and large, I find the industry to be very responsible and supportive.

Mr. **Hilton**. And very responsive, yes, sir.

Mr. **Boehlert**. Exactly.

Mr. Willey, I've saved some of these questions for you, because, as you might suspect, I have a number of them.

I'm a little bit confused by your testimony. First, it seems that you argue against any action; then you seem to endorse the basic approach we're taking; then it seems to be you're opposing provisions of the bill. I'd like to examine more closely just where you are.

First of all, in what ways do NFPA's codes differ from the requirements of this bill?

Mr. **Willey**. Okay, I don't have a copy of the standards with me or the life safety code, but two basic points: A life safety code that we had previously recommended is a system of requirements for fire life safety, which includes a number of things: exits; compartmentation, such as enclosing stairways; interior finish controls to reduce the possibility of fire spread; detection and alarm systems, that we've been talking about.

Mr. **Boehlert**. How would you deal with retrofitting?

Mr. **Willey**. Retrofitting would come under a situation where the code was being applied to an existing building, and, in fact, that's an excellent feature of the life safety code. It's the only model code that does have specific requirements for existing buildings. So there are incentives built into the code.

Mr. **Boehlert**. Does that requirement include sprinklers?

Mr. **Willey**. Yes, as far as the incentives that are built into the code. In other words, there are tradeoffs that are recognized.

If sprinklers are installed, there are allowances for modifications of the egress requirements, interior finish requirements, some of the—

Mr. **Boehlert**. So you're saying "if." So the NFPA code does not require sprinklers in all the facilities that we would require sprinklers in. Is that correct?

Mr. **Willey**. The code covers sprinklers in high-rise hotels—new high-rise hotels.

Mr. **Boehlert**. New high-rise. No retrofitting.

Mr. **Willey**. Retrofitting would be a part of an existing building consideration if the code was being applied to existing buildings.

Mr. **Boehlert**. Well, bottom line, so that I understand it—I mean you're an expert in this field, and I'm a novice, but I'm interested. Bottom line: NFPA code, would it require, in the final analysis, the same thing that this bill would require—that is, the installation of sprinkler systems in all hotels or motels two stories or more?

Mr. **Willey**. It would require sprinkler systems in new high-rise hotels.

Mr. **Boehlert**. New high-rise?

Mr. **Willey**. Yes. That's plus the other features that I mentioned, which are important.

Mr. **Boehlert**. Well, the answer is no then, it would not cover the same as we do.

Now you endorse a strict Federal travel policy, but then you raise the issue of States' rights. I believe that appears on page 7. Aren't these standards contradictory?

Mr. **Willey**. I think the real issue is how you reach all of the communities, all of the cities, all of the facilities, to effect ultimately fire safety. I think Dr. Hall's facts in his paper show that part of the hotel fire problem are in a category of hotels that might not be reached by H.R. 94. We're talking about, as in the multiple-death fires, the records that we've collected, the fires that we've investigated, many of them are in facilities that are on the lower end of the market, lower than you've been addressing earlier. They are primarily residential population, the elderly, the poor, the places that you and I, quite frankly, probably would not stay at.

Mr. **Boehlert**. Before I proceed, I'd like to defer to Mrs. Morella—she has another commitment on her very busy schedule—and then I'll come back to my questions.

Mrs. Morella.

Mrs. **Morella**. Thank you. Thanks, Mr. Chairman. I appreciate that, and I really enjoyed that few moments in the—in the sun there, as chairman. I think I'd like to try again.

But I want—first of all, there are two questions I have, but one was picking up on what you had started to say, Mr. Chairman, with regard to the States' rights. I mean, actually, this bill is a voluntary bill, so it isn't really interfering with States' rights—right? I mean it's just saying, "If you don't do this, well, there'll just be, you know, $1.2 billion worth of business that, all together, could be lost to hotels that might not have had it otherwise," and so I don't see it. Would you agree with me that there really is no interference with States' rights?

Mr. **Willey**. States' rights, I think, comes into the fire safety concern in the area of code enforcement. In this country, code enforcement is primarily accomplished by State and local officials.

Mrs. **Morella**. Well, they could still do it. They could still do it, like my county, as Chief Hilton has said, has been really pretty progressive in this way. Others could continue to do it. But we're just saying that this is an incentive, it's an added incentive, and probably the only thing that, within our rights, as Members of Congress, that we probably can do without major problems.

All right. That takes care of that point. The other one is one of information, particularly for me. I just wondered, would you explain to me, if you can do it briefly—and Mr. Boehlert probably already knows this—something about the NFPA and how it works. I'm curious about, for instance, some sense of how the hotel industry—whether it contributes to your revenues, to what degree it does, and the sprinkler industry. How do you all interface? It sounds like a cliche, "interface," but how do you all connect? Tell me what you do.

Mr. WILLEY. The National Fire Protection Association is a non-profit membership organization in its very basic structure. It's dedicated in terms of the mission of fire safety to saving lives and property in this country through various programs.

Now how does one become a member? Well, our membership is available to anyone. We're approaching 50,000 members. The principal categories of a membership include the Fire Service; health care community, as a matter of fact; Government, Federal Government employees; fire protection engineers; the insurance industry; and so forth. So anyone in the hotel industry, certainly, who is concerned with fire safety in their facilities could become members of NFPA. So it's basically a membership organization of individuals who are concerned—have a concern about fire safety. It includes many, many people who wear different hats.

There are member sections also that one can belong to. For instance, our Fire Service members have a Fire Service Section; they have their own newsletter; they have their own meetings within our broader annual fall meetings, and there's a chance for them to interact. Fire marshals would be another example.

Mrs. MORELLA. How about the hotel industry? How much do they contribute in terms of revenues?

Mr. WILLEY. I couldn't answer that. I really don't know.

Mrs. MORELLA. Can you find out and let us know?

Mr. WILLEY. We would be delighted to provide any information that you need that we can.

Mrs. MORELLA. Okay. All right.

And how about the sprinkler industry? Could you also give us that figure—how much they—

Mr. WILLEY. I really couldn't answer that. But we would be glad to prepare a statement

Mrs. MORELLA. You probably have somebody who can, though.

Mr. WILLEY. —for you that would be submitted.

Mrs. MORELLA. Fine. Thanks very much.

Thank you, Mr. Chairman.

[The information follows:]

National Fire Protection Association
International

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Batterymarch Park
Quincy, Massachusetts 02269-9101 USA
Telephone (617) 770-3000
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A. Elwood Willey
Assistant Vice President

March 10, 1989

The Honorable Doug Walgren
Chairman, Subcommittee on Science, Research and Technology
U. S. House of Representatives
2319 Rayburn House Office Building
Washington, DC 20515

Dear Congressman Walgren:

During my testimony March 2, 1989 regarding H.R. 94, "The Hotel and Motel Fire Safety Act", a question was raised regarding the financial contribution of the hotel industry and the sprinkler industry to NFPA. NFPA's response for the record follows.

The National Fire Protection Association (NFPA), organized in 1896, has as its mission the safeguarding of man and his environment from destructive fire, using scientific and engineering techniques, and education. The Association was incorporated in 1930 under the laws of the Commonwealth of Massachusetts and has its headquarters in Quincy, Massachusetts. NFPA is an independent, voluntary membership, nonprofit (tax-exempt) organization with a staff of over 300.

NFPA accomplishes its mission through technical and educational activities including: the development of national consensus standards, technical advisory services, fire investigations, fire statistics and data services, public education, continuing education, periodicals and technical publications.

Publishers of the National Fire Codes and National Electrical Code

A non-profit membership organization dedicated to promoting safety from fire, electricity, and related hazards through research, codes and standards, technical advisory services, and public education since 1896.

Page 2.
Congressman Doug Walgren
March 10, 1989

NFPA is financed principally by sales of its publications and audiovisual materials, and to a lesser extent by membership dues, income from seminars, research grants, and contributions. It operates on an annual budget of approximately $40 million. Contributions from all sources to the Association amount to approximately $400,000 and are used to offset public fire prevention education efforts, field services and other Association activities.

Membership in NFPA totals nearly 50,000 individuals who pay $60 annual dues each, and 130 national trade and professional organizations who pay $325 annual dues each. The vast majority of the members are residents of the United States, but due to our international status, we have many members from Canada and 85 other nations. Members are drawn from fire departments (24%), business and industry (20%), health care facilities (12%), federal, state and local government (8%), architects and engineers (8%), insurance (6%), fire equipment manufacturers and distributors (6%), trade and professional associations (2%), and other miscellaneous fields, such as consumers, educators, consultants, etc. (14%). Within the membership are 13 Sections comprised of members with common firesafety interests such as Fire Marshals, Fire Service, Education, Research and the Lodging Industry.

As one can observe, unlike a trade association, no single interest group dominates NFPA's membership. Lodging industry members fall under the business and industry category listed above, and members from the sprinkler industry would be included under the fire equipment manufacturers and distributors category. Also, we do not keep specific financial data on how much these industry groups purchase from NFPA in the catagory of publications and services.

We appreciated having the opportunity to present testimony on H.R. 94 in the interest of improving firesafety in our nation's hotels and motels. If we can be of further assistance to the Committee, please let me know.

Respectfully submitted,

a Elwood Willey

A. Elwood Willey
Assistant Vice President
Research and Fire Information Services

AEW:jms

Mr. BOEHLERT. Mr. Willey, how would USFA be duplicating the work of voluntary organizations under this bill? You're suggesting that. I mean, in the past, NFPA has said it wouldn't mind if GSA carried out these same activities. Why isn't it duplication when GSA carries it out but it would be duplication if USFA carries it out? I can't quite figure that out.

Mr. WILLEY. First of all, as far as the U.S. Fire Administration, I have worked with many of their staff members for a number of years. We've worked together on programs. So we're not—you know, I'm not in a confrontational situation with the USFA, because we have worked with them on many programs, and we look forward to working with them in the future.

I think the issue is in terms of—that Federal agency writing standards and applying or enforcing standards, and, as I said earlier, in this country code enforcement is a State and local issue.

Mr. BOEHLERT. It is under the bill, too. You know that. It is under the bill, too.

Mr. WILLEY. Yes.

Mr. BOEHLERT. Keep in mind, although I'm chairman, I'm also a Republican.

All right. I want to thank—incidentally, Mr. Willey, my wife's maiden name is Willey, so I've been extra gracious with you today.

[Laughter.]

Mr. BOEHLERT. Thank you all so very much. Your testimony is really appreciated, and I thank you.

Our final panel, number three, consists of Rex E. Jordan, who is the Nevada State Fire Marshal; Charles A. Henry, the Pennsylvania State Fire Commissioner, Pennsylvania Emergency Management Agency; and Richard E. Botts, Vice President, Manager of Risk Control Services, Fred S. James and Company.

Gentlemen, I'd like to welcome you to the hearing and thank you for sharing with us your expert testimony, and we'll proceed in the manner in which I announced the panel: Mr. Jordan, followed by Mr. Henry, and then Mr. Botts.

Your entire statements will appear in the record. If you wish to summarize in any way, so be it. Just be as—go about it in a convenient manner.

Mr. Jordan.

STATEMENTS OF REX E. JORDAN, NEVADA STATE FIRE MARSHAL, CARSON CITY, NEVADA; CHARLES A. HENRY, PENNSYLVANIA STATE FIRE COMMISSIONER, PENNSYLVANIA EMERGENCY MANAGEMENT AGENCY, HARRISBURG, PENNSYLVANIA; AND RICHARD E. BOTTS, VICE PRESIDENT, MANAGER OF RISK CONTROL SERVICES, FRED S. JAMES AND COMPANY, INC., HARRISBURG, PENNSYLVANIA

Mr. JORDAN. Thank you, Mr. Chairman.

Mr. BOEHLERT. Would you make sure the mike is on?

Mr. JORDAN. Thank you, Mr. Chairman. I appreciate the opportunity to be here today. For the record, I'm Rex Jordan, Fire Marshal for the State of Nevada, and I'm here to provide you with some facts pertaining to Nevada's fire retrofit law and provide answers to questions you may have.

As one of the senior fire marshals in this country, let me congratulate the Congress, this committee, and particularly Congressmen Boehlert, yourself, and Walgren, and Walker, for introducing H.R. 94—hotel/motel. Too often, we've seen over the years legislation by catastrophe, and this is what it boils down to. We could use our resources to mitigate some of these things, because we know it's going to happen.

Let me state emphatically for the record that Nevada's fire retrofit law is working. We have not had a life loss from a fire in a hotel or motel that is sprinklered and equipped with smoke detectors since 1985. We did experience the deaths of four persons in an unsprinklered motel due to an act of arson, which serves to point out the need for automatic systems. This motel was being remodeled to meet retrofit standards when it was set afire, and I might add, arson is the second leading cause of fires in hotel/motel properties.

After the terrible MGM fire which killed 85 persons, and one died later, in November of 1980—we had 679 people injured; there were 5,000 people in that building when that fire occurred—Nevada had a commission to study fire and building codes, and that generated some legislation, and, with your permission, I have a copy of that original legislation and a copy of the commission report which I would offer to the committee for a resource document.

Mr. BOEHLERT. Thank you so very much.

[The legislation and report follow:]

Senate Bill No. 214—Senators Neal and Hernstadt

CHAPTER............

AN ACT relating to fire protection; applying certain requirements relating to fire safety to certain buildings; creating a board of fire safety and providing for its organization, powers and duties; and providing other matters properly relating thereto.

The People of the State of Nevada, represented in Senate and Assembly, do enact as follows:

SECTION 1. Chapter 477 of NRS is hereby amended by adding thereto the provisions set forth as sections 2 to 12, inclusive, of this act.

SEC. 2. *As used in this chapter, unless the context otherwise requires, "authority" means:*

1. The state fire marshal in counties having a population of less than 100,000;

2. Unless the county has enacted an ordinance designating the persons who constitute the authority, the chief building official and chief officer of the fire service of the jurisdiction in any other county. If the chief building official and the chief officer of the fire service are unable to agree on any question, "authority" includes the county manager or city manager, who shall cast the deciding vote on that question; or

3. If the board of county commissioners of a county having a population of 100,000 or more or the governing body of a city in that county has specified a person or persons to act as the authority, that person or those persons.

SEC. 3. *1. After May 15, 1981, the governing body of a local government may not adopt an ordinance requiring changes to existing structures to enhance the safety of occupants from fire if the ordinance is:*

(a) Less stringent than this chapter; or

(b) More stringent than this chapter unless the governing body has sought and obtained approval of the ordinance from the state board of examiners.

SEC. 4. *The owner or operator of any building, except a single-family detached dwelling, shall:*

1. Equip every exit corridor and other means of exit with emergency lighting of a type approved by the authority which permits the safe evacuation of the building.

2. Equip every door to an exit corridor which serves 30 or more occupants with a device, approved by the authority, which closes the door.

3. Immediately provide adequate facilities for exit.

4. If the building has three stories or more, enclose every open stairway or vertical shaft with:

(a) Construction whose resistance to fire has been approved by the authority; or

(b) Alternate means approved by the authority which afford equivalent protection to life and property from fire.

SEC. 5. *The owner or operator of every hotel or motel of three stories or more which contains 20 or more guest rooms, apartment building or condominium of three stories or more with 15 or more dwelling* *units, or any office building of three stories or more shall equip the building with fire alarms in compliance with paragraph 2 of section 1202B of the 1979 edition of the Uniform Building Code.*

SEC. 6. *1. The owner or operator of every hotel or motel which contains at least six guest rooms, or apartment building with at least three dwelling units, shall equip each room primarily used for sleeping in a hotel or motel and each dwelling unit in an apartment building with a smoke-detector, the placement of which is approved by the authority.*

2. The owner or operator of every hotel or motel which contains at least six guest rooms, or apartment building or condominium with at least three dwelling units shall seal any opening used to supply air from a corridor to a guest room or to a dwelling unit unless:

(a) The corridor contains smoke-detectors as required by regulation of the state fire marshal;

(b) Activation of any two detectors causes the supply of air to cease and seals the opening between the room and the corridor; and

(c) He obtains the approval of the authority to supply air in this manner.

SEC. 7. *The owner or operator of every hotel, motel, office, apartment building or condominium where human occupancy is permitted on floors which are more than 55 feet above the lowest level of ground accessible to vehicles of a fire department, shall:*

1. Equip each exit corridor of the building with fire sprinklers as required by regulations of the state fire marshal;

2. Except in a condominium, equip each room with at least one fire sprinkler above each door opening into an exit corridor of the building;

3. Equip every elevator so as to permit it to be recalled automatically, in compliance with section A 17.1 of the 1978 edition of the American National Standards Institute and section 211.3 of the 1981 amendments to that edition, to the first floor or, if necessary, to any other floor of the building not affected by fire;

4. Post the number of each floor in every stairwell and in every lobby adjacent to an elevator;

5. Equip the heating, ventilating and air-conditioning system with an automatic device to shut it off as prescribed in section 1009 of the 1979 edition of the Uniform Mechanical Code, and with an additional smoke-detector as required by the 1978 edition of National Fire Protection Association Standard 90A; and

6. In each room primarily used for sleeping, except in a condominium:

(a) Post in a prominent location an explanation of the route to use for evacuation of the building; and

(b) Install a paging alarm system which conforms to the regulations of the state fire marshal, to permit vocal warning and instructions to the occupants.

7. In a condominium, install in the common areas a paging alarm system meeting the requirements of paragraph (b) of subsection 6, with a sound level of 80 decibels.

SEC. 8. *1. The owner or operator of every building or portion of a building used for public assembly except churches and buildings associated with them, meeting halls of fraternal organizations, and gymnasiums belonging to schools and other nonprofit organizations:*

(a) Which has a room or rooms which have a total floor area of more than 5,000 square feet and which are used for public assembly, within a building with a total floor area of 12,000 square feet or more, shall install automatic sprinklers for protection from fire as required by regulation of the state fire marshal, except in those areas where the authority waives this requirement. The authority may waive this requirement for any space which is separated from this area by construction whose resistance to fire has been approved by the authority.

(b) Which is certified for occupancy by more than 300 persons shall:

(1) Use interior finishes in the areas used for public assembly which comply with chapter 42 of the 1979 edition of the Uniform Building Code as it relates to retarding the spread of fire; or

(2) Install automatic sprinklers in the areas used for public assembly for protection from fire as required by regulations adopted by the state fire marshal.

2. For the purposes of this section, a building or a portion of a building is used for public assembly if 50 or more persons assemble there for any purpose other than in the normal course of their employment.

SEC. 9. *The owner or operator of a building shall not construct a facility for or permit helicopters to land on top of the building unless the authority approves this landing. The authority shall base its decision upon the physical construction of the remainder of the building and the relative risks to human safety from permitting or denying the landing of helicopters.*

SEC. 10. *1. The board of fire safety, consisting of eleven members appointed by the governor, is hereby created.*

2. The governor shall appoint:

(a) A licensed architect;

(b) Three chiefs of or fire marshals from local fire departments, at least one of whom must be from a fire department in a county having a population of less than 100,000;

(c) A building official of a local government which is or is within each county having a population of 100,000 or more;

(d) A licensed general contractor;

(e) A professional engineer;

(f) Two representatives of gaming and lodging enterprises; and

(g) The state fire marshal,

to the board.

3. The board shall select a chairman from among its members to serve for 1 year. The state fire marshal shall serve as secretary of the board.

4. The board shall meet approximately once each month or at least eight times a year or on the call of the chairman, the state fire marshal or a majority of the members.

5. The members of the board, except those who are public officers or employees, are entitled to receive a salary of $80 for each day's attendance at a meeting of the board or a committee of the board and all members are entitled to the per diem allowances and travel expenses provided *by law. The state fire marshal shall provide in the budget of his office for sufficient money to pay salaries and allowances for members and other expenses of the board.*

SEC. 11. *The board of fire safety shall:*

1. Hear and decide requests for variances from the provisions of sections 3 to 8, inclusive, of this act and requests for permission to undertake alternate methods of achieving substantial compliance with those provisions; and

2. Review local ordinances which require stricter standards than those required by sections 3 to 8, inclusive, of this act for retrofitting of buildings and recommend to the state board of examiners whether the ordinances should be approved.

SEC. 12. *1. A person may request a variance from the provisions of sections 3 to 8, inclusive, of this act by filing a petition with the board of fire safety.*

2. Within 30 days after receiving a petition, the board shall grant the petitioner a hearing and, upon a showing that existing features or alternate methods achieve substantial compliance with those provisions and that complete compliance will not significantly further the safety of persons in the building, may grant a variance. The board shall issue its order within 30 days after the hearing.

SEC. 13. 1. Each authority as defined in section 2 of this act shall, within 12 months after the effective date of this act, complete a survey of each building within its jurisdiction subject to the provisions of sections 3 to 8, inclusive, of this act.

2. When the authority completes its survey of a building, it shall immediately furnish a copy of the survey to the owner or operator of the building.

3. The owner or operator shall:

(a) Furnish to the authority within 6 months after receiving the copy of the survey his plans to effect the corrections identified by the survey as necessary for compliance with sections 3 to 8, inclusive, of this act.

(b) Make all of those corrections within 36 months after the effective date of this act.

4. The board of fire safety may waive the times prescribed in this section for:

(a) Completion of surveys by a responsible authority; and

(b) Submission of plans or completion of work, or both, by an owner or operator,

if the applicant for the waiver demonstrates an appropriate effort and a genuine inability to comply within the time prescribed.

SEC. 14. There is hereby appropriated from the state general fund to the state fire marshal division of the state department of commerce the sum of $164,648 for the fiscal year beginning July 1, 1981, and $140,627 for the fiscal year beginning July 1, 1982, for the purposes of paying salary, per diem and travel expenses of members of, and for the other expenses of the board of fire safety and for expenses of carrying out the duties imposed upon him by this act. The unencumbered balances of the appropriations for the fiscal years beginning July 1, 1981, and July 1, 1982, may not be committed for expenditure after June 30, 1982, and

June 30, 1983, respectively, and revert to the state general fund as soon as all payments of money committed have been made.

SEC. 15. Sections 10, 11 and 12 of this act expire by limitation on July 1, 1985.

SEC. 16. This act shall become effective upon passage and approval.

STATE OF NEVADA

GOVERNOR'S COMMISSION ON FIRE SAFETY CODES

Final Report

This study was funded by a grant from the Four Corners Regional Commission (Grant FCRC No. 311-800-020-1).

REPORT OF THE GOVERNOR'S COMMISSION ON FIRE SAFETY CODES

March 11, 1981

Any statements of opinion and/or recommendations are those of the authors and do not necessarily reflect the official opinion of the Four Corners Regional Commission or any of its members. Additional funding was provided by the Federal Emergency Management Agency.

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NEVADA INDEPENDENT INSURANCE AGENTS

March 11, 1981

The Honorable Robert List, Governor
State of Nevada
Capitol Complex
Carson City, NV. 89710

Dear Governor List:

Transmitted herewith, pursuant to your Executive Order of November 24, 1980, is the final report of your Commission on Firesafety Codes. With the issuance of this report the Commission has completed your charge.

In our effort to address the many technical and administrative problems associated with code promulgation and enforcement the Commission participated in eight meetings in Las Vegas. You will find this report to be extremely comprehensive within the time parameters available. However, because of the magnitude of the many problem areas considered by this volunteer group, we have not been able to provide all encompassing recommendations or solutions. Ultimately the many ramifications of the areas addressed by the Commission will require an ongoing effort by a standing body as advocated within the report.

You are to be commended for your formation and support of the Commission on Firesafety Codes. The Commission worked diligently in the discharge of your Executive Order and deserve appreciation from the people of the State of Nevada for their effort. I personally appreciate the opportunity to have been a part of this endeavor. I feel that this document will serve as a guideline in years to come for other States and Nations as they too attempt to cope with the many problems of public safety.

Sincerely Yours,

Kenny C. Guinn
Chairman
Governor's Commission on
Firesafety Codes

KCG/kk

GOVERNOR'S COMMISSION ON FIRE SAFETY CODES

CHAIRMAN

DR. KENNY C. GUINN
Las Vegas Financial Executive

MEMBERS

JOHN G. DEGENKOLB
Glendale, California Fire Protection Engineer

THALIA DONDERO
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REPORT OF THE GOVERNOR'S COMMISSION ON FIRE SAFETY CODES

SCOPE OF CHARGE AND MEMBERSHIP OF COMMISSION

The Governor's Commission on Fire Safety Codes was established by the Honorable Robert List, Governor of the State of Nevada on November 24, 1980 by executive order. (Appendix I.) The Governor's charge to the Commission was to conduct a thorough review of all conditions and regulations pertaining to fire safety codes of the State of Nevada regulating the construction of highrise buildings and public assembly occupancies within the State of Nevada for their adequacy and effectiveness in protecting the public. It was mandated that this review should be extended to evaluation of codes and regulations governing the same classifications of occupancies constructed prior to adoption of the current State Fire Marshal's codes and regulations. (Appendix II.) The Commission was directed to deliver its findings and recommendations to the Governor no later than March 1, 1981.

The Commission, which consisted of nine members, included a representative of the private business sector, state and local officials, elected public representatives, and experts in the field of fire and building codes. Dr. Kenny Guinn, Las Vegas financial executive, was appointed chairman of the Commission. Tom Huddleston, the Nevada State Fire Marshal, Roy Parrish, Clark County Fire Chief, and Robert Weber, Clark County Director of Building and Zoning, were the state and local officials appointed to the Commission. Bill Farr, Washoe County Commission Chairman and Thalia Dondero, Clark County Commission member, were the two elected officials on the Commission. Following a national search, three prominent fire and building code experts were appointed to the Commission. John G. Degenkolb, Glendale, California fire protection engineer, Jasper S. Hawkins, Phoenix architect and Perry Tyree, Colorado Springs regional building official accepted positions on the Commission

The Commission held its first meeting December 3, 1980. A total of eight meetings were conducted in Las Vegas under the direction of Dr. Kenny Guinn, the chairman of the Commission. Based on the Commission's determination of the Governor's charges, the codes and regulations adopted by the Nevada State Fire Marshal in 1978 were reviewed. In addition, the Commission reviewed the 1979 edition of the Uniform Building Code to see if modification was needed prior to adoption by the Nevada State Fire Marshal. A third area of review was an evaluation of possible methods to improve the life safety features of existing highrise and public assembly occupancies within the State.

CODES AND REGULATIONS ADOPTED BY THE NEVADA STATE FIRE MARSHAL IN 1978

After consideration of available relevant materials, it is the unanimous finding of the Commission that the present code and regulatory structure of Nevada concerning new construction of highrise buildings is consistent with and more stringent than most codes and regulations in the United States and has been so since 1978. (Appendix III.) The various code authorities on the Commission unanimously agree that Nevada's mandatory sprinkler requirement, along with other adopted regulations and codes, clearly substantiate that Nevada is in a place of national leadership in the area of fire and life safety protection in new highrise construction. (Appendix II.) The present codes and regulations governing public assembly occupancy spaces in the State of Nevada compare favorably with other leading states throughout the nation with the exception of interior finish requirements. This comparison is supported by the fact that most states base their fire and life safety requirements on certain model codes and/or National Fire Protection Association codes. A full range of model codes has been adopted by the Nevada State Fire Marshal to deal with all aspects of fire and life safety. However, the Commission as a whole has determined that specific areas in the codes governing public assembly occupancy spaces require improvement and must be dealt with as set forth within the Commission's recommendations.

ANALYSIS OF THE 1979 UNIFORM BUILDING CODE

Pursuant to the Commission's review of the 1979 edition of the Uniform Building Code, the following code changes were submitted by members of the Commission for consideration and distribution nationwide to numerous code authorities including architects, private industry, code writing organizations and code enforcement agencies for comment:

> **1807 (a) Scope.** This section shall apply to all Group B, Division 2 office buildings and Group R, Division 1 occupancies, each having floors used for human occupancy located more than 55 feet or five stories above the lowest level of fire department vehicle access. Such buildings shall be provided with an approved automatic sprinkler system in accordance with Section 1807 (c).
>
> **1807 (b) Certificate of Occupancy.** Add the following sentences. "All such equipment shall be tested quarterly by an approved agency. All life safety equipment shall be reset and certified by an approved agency after having been actuated. A log of such tests shall be kept available for inspection by the fire department. Testing shall follow procedures developed by the building designer and approved by the building official."
>
> **1807 (e) Alarm and Communication System.** Retain the present subsection but with (2) modified to be consistent with the present fire marshal requirements which refers to an 80 decibel level of sound at all points within the protected property.
>
> **1807 (f) Central Control Station.** Retain the present subsection but with further modification as currently in the fire marshal requirements which calls for the central control station to be separated from the remainder of the building by a 2-hour fire-resistive construction and to have a door directly to the exterior whenever possible.
>
> **1807 (h)** Delete the present section and substitute a requirement that elevators be installed in compliance with ANSI A17.1-1978 with the 1981 amendments. Then add the following sentence:
>
> "All elevators on all floors shall open into elevator lobbies which are separated from the remainder of the building, including corridors, as is required for corridor construction in Section 3304 (g) and (h)."
>
> **1807 (j)** Modify (1) by adding at the end of the present sentence "sprinkler operation or power failure."
>
> Modify (3) by changing the figure 0.15 to 0.25 in 3rd line.
>
> **Section 3802 (b) 2B.** Modify to read:
>
> "Every casino, showroom and other assembly room of more than 5,000 square foot area."
>
> EXCEPTION: Churches and theaters having only fixed seating.
>
> **Section 3802 (c).** Add a new Item B under (1) and redesignate the existing Items B, C and D. The new Item B is to read as follows: "In buildings over two stories in height."

After extended deliberation by the Commission and examination of the limited responses to the Commission's letter dated January 6, 1981, (Appendix IV) this Commission recommends that the Governor direct the Nevada State Fire Marshal to make the following modifications when adopting the 1979 Uniform Building Code which will regulate all new construction:

> **1807 (a) Scope.** This section shall apply to all Group B, Division 2 office buildings and Group R, Division 1 occupancies, each having floors used for

human occupancy located more than 55 feet above the lowest level of fire department vehicle access. Such buildings shall be provided with an approved automatic sprinkler system in accordance with Section 1807 (c).

1807 (b) Certificate of Occupancy. Add the following sentences: "All such equipment shall be tested quarterly by an approved agency. All life safety equipment shall be reset and certified by an approved agency after having been actuated. A log of such tests shall be kept available for inspection by the fire department. Testing shall follow procedures developed by the building designer and approved by the building official."

1807 (e) Alarm and Communication System. Retain the present subsection but with (2) modified to be consistent with the present fire marshal requirements which refers to an 80 decibel level of sound at all points within the protected property.

1807 (f) Central Control Station. Retain the present subsection but with further modification as currently in the fire marshal requirements which calls for the central control station to be separated from the remainder of the building by a 2-hour fire-resistive construction and to have a door directly to the exterior whenever possible.

1807 (h) Delete the present section and substitute a requirement that elevators be installed in compliance with ANSI A17.1-1978 with the 1979 and 1980 amendments and Section 211.3 of the 1981 amendments. (Appendix V.) Then add the following sentence:

"All elevators on all floors shall open into elevator lobbies which are separated from the remainder of the building (Appendix VI), including corridors, as is required for corridor construction in Section 3304 (g) and (h)."

1807 (j) Modify (1) by adding at the end of the present sentence "sprinkler operation or power failure."

Modify (3) by changing the figure 0.15 to 0.25 in 3rd line.

3802 (b) Modify 2B to read:

"Every casino, showroom and other assembly room of more than 5,000 square foot area."

EXCEPTION: Churches and theaters having only fixed seating.

3802 (b) Add a new Item B under (1) and redesignate the existing Items B, C and D. The new Item B is to read as follows: "In buildings over two stories in height."

RETROACTIVE APPLICATIONS

During consideration of methods to improve the fire and life safety features of existing highrise and public assembly occupancies, the Commission reviewed the 1976 Uniform Building Code requirements for undating fire and life safety features in existing buildings constructed prior to Nevada's most recent code adoption in 1978. This review revealed Chapter 1 of the 1976 edition of the Uniform Building Code as the only existing legal vehicle to compel the incorporation of retroactive life safety features in existing structures. These provisions are only applicable to an existing structure when the value of the additions or alterations exceeds fifty (50) percent of the value of the existing structure. Thus the provisions are of little or no value in resolving the present problems relating to existing highrise buildings in Nevada. (Appendix VII.)

The Commission considered the retroactive provisions of Chapter 1 of the Uniform Building Code to be too general in nature and therefore the Commission determined that specific requirements must be proposed. With this thought in mind the Commission studied a fire hazard analysis survey of thirty-five (35) highrise fires occurring during the period of September, 1964-January, 1975. (Appendix VIII.) This survey provided substantial information concerning specific recurring building deficiencies having an adverse affect on fire and life safety of both occupants and firefighters. Predicated upon the information obtained in this analysis and through extensive discussion within the Commission, the Governor's Commission on Fire Safety Codes feels the following recommendations must be implemented to develop a reasonable degree of fire and life safety in existing buildings.

1. All Group B, Division 2 office buildings and Group R, Division 1 occupancies, each having floors used for human occupancy located more than fifty-five (55) feet above the lowest level of fire department vehicle access shall be sprinklered in each exit corridor with at least one sprinkler head located inside each room over every door opening onto that corridor. (Appendix IX.)
2. In assembly occupancies of over five thousand (5,000) square feet of floor area which can be used for exhibition or display purposes including casinos and showrooms, sprinklers are required. All concealed and occupiable spaces not physically separated by approved fire-rated construction from the area required to be sprinklered shall also be sprinklered. EXCEPTION: Churches and theaters having only fixed seating.
3. Open stairways or vertical shafts in buildings three (3) or more stories in height shall be enclosed with protected assemblies or by alternate means providing equivalent fire and life safety.
4. Door closers shall be required on doors opening into exit corridors.
5. Emergency lighting shall be required in exit corridors and other integral portions of means of egress essential for safe evacuation of the building in question.
6. Smoke detectors shall be required in sleeping quarters offered in all R1 occupancies (apartments and hotels).
7. One-way voice communication systems shall be required in each sleeping room offered in all highrise (55 feet) occupancies.
8. Immediate action shall be taken to assure adequate exit facilities.
9. Combustible fiber board interior finishes shall not be allowed in A1, A2 or A2.1 occupancies (assembly occupancies over 300 occupants).
10. Whenever it is found that the corridor is being used to supply air to a guest

room or dwelling unit, that use must be discontinued by sealing off the opening. The authority having jurisdiction may permit the continued use of the corridor to supply air provided smoke detectors are installed within the corridor in conformance with their listed spacing. Actuation of any two detectors shall cause the air supply to the corridor to shut down and cause closure of the opening between the room and the corridor.

11. Automatic recall to the first floor or an alternate, non-fire floor will be required for all elevators in highrises (55 feet) in conformance with the 1978 edition of ANSI A17.1 and Section 211.3 of the 1981 amendments. (Appendix V.)

12. There shall be a posting of the number of each floor in the stairwell and every elevator lobby area.

13. Evacuation routes shall be posted in each sleeping room in all highrise R1 occupancies (apartments and hotels).

14. Automatic shutoff shall be provided for the heating, ventilating and air-conditioning system as proscribed in the 1979 edition of the Uniform Mechanical Code Section 1009 with an added smoke detector as required in the 1978 edition of the National Fire Protection Association Standard 90A for automatic shutdown.

15. Consideration should be given to the establishment of emergency helistops where applicable and approved by the authority having jurisdiction.

16. Requirements for fire alarm systems shall conform to Section 1202 B, paragraph 2 of the 1979 Uniform Building Code.

These recommendations have been more specifically directed toward places of assembly and hotels and apartment houses. While the Commission's recommendations include all buildings having a floor level more than fifty-five (55) feet above the level of fire department vehicle access, buildings of other occupancies such as office buildings must be given additional study. The sprinkler, elevator, stair enclosure and automatic shutoff for heating, ventilating and air-conditioning systems regulated by Section 1009 of the Uniform Mechanical Code, 1979 edition, requirements are applicable to all buildings exceeding fifty-five (55) feet.

IMPLEMENTATION

Adequate enforcement of codes and regulations was of primary importance throughout the Commission's deliberations. Potential trade-offs or alternatives were seen to be a necessary ingredient in a practical retroactive program. Rapid and active participation must be encouraged through the application of tax incentives for the private sector. A timetable for implementation must be set, structures must be individually reviewed and procedures for retroactive implementation of fire and life safety features must be developed.

Due to the magnitude of the complex problems studied by the Commission, we have not been able to provide all encompassing recommendations or solutions. Therefore, the Governor's Commission on Fire Safety Codes feels strongly that an ongoing standing Advisory Board must be formed to consider retroactive application of life safety features to existing structures and to serve as an active appeals board. This Advisory Board should be within the office of the Nevada State Fire Marshal with a fulltime paid staff and a budget. This standing Advisory Board would consider the additional matters the Commission found beyond its time limitation capabilities to thoroughly examine. It is the feeling of this Commission that the Advisory Board can begin to generate positive results almost immediately. The Commission further feels that it is imperative that retroactive application take place as soon as possible. However, due to the highly technical and controversial nature of retroactive application recommendations, a period not to exceed three (3) years from the date applicable legislation is signed into law by the Governor of the State of Nevada will be required for the State of Nevada, or the local authority having jurisdiction, to survey and implement some of these recommendations and to adequately address the numerous ramifications of retroactive fire and life safety modifications. It is important to note that many of the Commission's recommendations such as smoke detectors, stairwell numbering and emergency lighting can be implemented immediately. The Commission strongly recommends plans for correction must be submitted to the authority having jurisdiction within six (6) months after the completion date of a survey for an individual building.

The Commission also recommends the development of an evaluation process that would determine the adequacy of existing code enforcement practices. This would involve the Advisory Board in the conducting of reviews of the local jurisdiction's pre-design conferences, plan reviews, construction site inspections, regular inspection programs insuring maintenance and management of existing buildings. The Commission believes this evaluation should result in identification of needs for staffing, resources, and legal authority as well as the development of guidelines and materials for use by the state and local authorities.

Under the auspices of an active Advisory Board, the Commission feels fire and life safety programs must be developed for education and training in schools, for the general public, for operating personnel and building staff. A program for evaluation of new technology and architectural designs must be developed and maintained at the highest level if Nevada is to provide the best possible fire and life safety protection for its citizens and visitors. Should the current laws of the State of Nevada on revenue and expenditure limitations (caps) adversely affect these recommendations by the Commission, Nevada legislation must be developed to alleviate the problem.

The Commission further recommends that the Congressional delegation of the State of Nevada move toward the development of reasonable incentives for the private sector for retroactive application of new fire and life safety features. This could translate into tax incentives such as investment credits, accelerated depreciation schedules and tax credits. The Commission further urges the Congressional delegation to consider calling national committee hearings in this regard and to submit appropriate bills in the United States Senate and the United States House of Representatives.

Similarly, this Commission calls upon the Nevada State Legislature to consider related types of incentives at the state and local level. This might include, for example, adjustments for assessments of real property.

SUMMARY

The Governor's Commission on Fire Safety Codes has found that due to its time constraints, it has only begun a process through which the State of Nevada may ultimately address all of the problems associated with fire and life safety in existing highrise and public assembly occupancies.

The members of the Commission wish to emphasize the existence of the myriad of technical and administrative details to be resolved. The members were not able to completely consider the areas of application, initiation or enforcement. Failure to adequately address such areas will have serious ramifications upon any programs or laws developed as a result of this Commission's findings and recommendations. It is, therefore, the **unanimous recommendation** of the Governor's Commission on Fire Safety Codes that the State of Nevada establish an Advisory Board with adequate staff, funding and support, to develop a systematic ongoing program to deal with the many issues beyond the immediate recommendations of the Commission. Modifications of the 1979 Uniform Building Code are recommended to the Nevada State Fire Marshal for inclusion in his adoption of this code. The scope of Section 1807 of the 1979 Uniform Building Code is expanded. Sprinklering requirements are strengthened. Alarm and communication system requirements are modified. Lobbies are required for elevators. Exit requirements from stairways are expanded. In conjunction with these modifications to the 1979 Uniform Building Code this Commission recommends testing requirements for all fire and life safety equipment be incorporated in the Nevada State Fire Marshal regulations.

The Commission feels its most far reaching recommendations relate to the retroactive measures encompassing mandatory sprinklering, smoke detectors, door closers, emergency lighting, elevator control, one-way voice communication in sleeping rooms, open stairwell enclosure, posting of evacuation routes, helistops, numbering of floors, automatic shutoff for air systems, improvement of egress, flammable finishes, fire alarms and air supply control.

These recommendations in conjunction with the establishment of the ongoing Advisory Board will place the State of Nevada in the forefront of fire and life safety throughout the Nation.

Appendix I

STATE OF NEVADA
EXECUTIVE CHAMBER
CARSON CITY

AN EXECUTIVE ORDER BY THE GOVERNOR

WHEREAS, ensuring the safety of the public is a primary function of Government; and

WHEREAS, the threat of fire is a continuous danger to the safety of the public and can be the cause of death and injury; and

WHEREAS, the various levels of Government are charged with establishing and enforcing codes and regulations designed to minimize the chance of injurious fires; and

WHEREAS, the codes and regulations concerning fire safety are in need of periodic review for improvements in order to properly protect the public;

NOW, THEREFORE, I, ROBERT LIST, GOVERNOR OF THE STATE OF NEVADA, pursuant to the powers conferred upon me by the Constitution and laws of this State, do hereby establish

THE GOVERNOR'S COMMISSION ON FIRE SAFETY CODES

SCOPE:

The purpose of THE GOVERNOR'S COMMISSION ON FIRE SAFETY CODES is to review all codes and regulations currently in effect that pertain to fire safety codes in highrise and public-assembly occupancies within the State of Nevada, and all other codes and regulations relating to the subject of fire safety in highrise and public-assembly occupancies already in existence prior to 1973, for their adequacy and effectiveness in protecting the public.

THE COMMISSION:

The Commission will consist of nine members including the general public representatives and experts in the field of fire safety.

The Chairman shall be selected by the Governor at the time of appointment.

The Commission shall meet at the call of the Chairman.

The Commission expires on March 1, 1981, upon submission of its report and recommendations to the Governor no later than that date.

CHARGE:

The Commission is hereby ordered and directed to conduct a thorough review of all conditions and regulations currently in effect that pertain to fire safety codes in highrise and public-assembly occupancies within the State of Nevada, and all other codes and regulations relating to the subject of fire safety in highrise and public-assembly occupancies already in existence prior to 1973, for their adequacy and effectiveness in protecting the public. Further, the Commission is directed to deliver its findings and recommendations to the Governor no later than March 1, 1981. The Commission is empowered to conduct what hearings it deems necessary to gather needed information.

The Commission is also ordered and directed to work closely with all existing organizations at the local levels which can assist in achieving the purposes of this Order.

All state departments, boards, commissions, offices and employees are directed to cooperate with and assist the Commission in its work, within the limitations of staffing and other available resources.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Nevada to be affixed at the State Capitol this 24th day of November, in the year of our Lord, one thousand nine hundred and eighty.

Governor

Secretary of State

By: ....

Appendix II

NEVADA STATE FIRE MARSHAL REGULATIONS

Nevada State Fire Marshal Division
Carson City, Nevada

T. J. Huddleston
Nevada State Fire Marshal

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ARTICLE I GENERAL PROVISIONS

Chapter I

Title, Intent and Scope

1.101 Title.

This regulation shall be known as the state fire marshal's regulation.

1.102 Intent.

This regulation prescribes minimum requirements for sales, rental, leasing, installation, and service of fire and life safety equipment in accordance with the provisions of NRS 477.030.

This regulation deals with methods of restoring historic or architecturally significant buildings and classifies health facilities pursuant to the provisions of NRS 477.020.

Where no specific standards or requirements are specified in this regulation or contained within other codes adopted by the state fire marshal, compliance with the National Fire Codes of the National Fire Protection Association as adopted by the state fire marshal in this regulation is prima facie evidence of compliance with this intent.

1.103 Scope.

This regulation applies to all persons who are not specifically excepted. This regulation applies to all equipment, conditions, or buildings with the state unless specifically excepted.

Where there is a conflict between this regulation and any code, ordinance, or regulation adopted by local authority, the more stringent requirement providing the greatest fire and life safety to the public applies.

National codes are adopted with modifications by the state fire marshal within this regulation and are enforceable jointly with this regulation.

Chapter II

Administration

1.201 Enforcement.

Administration and enforcement of this regulation are the duties of the state fire marshal and his authorized representatives under the provisions of NRS 477.030.

Chapter III

Licenses and Registration

General Provisions

1.301 Licenses and Registration.

A license or certificate of registration issued by the state fire marshal constitutes conditional permission for a person to engage in the sale, installation, or servicing of equipment or systems specified on the license or certificate of registration. Licenses and certificates do not take the place of any other documents required by law.

A license or certificate issued by the state fire marshal remains the property of the state fire marshal division and must be renewed as required by this regulation. The license or certificate is not transferable and is revocable for cause.

1.302 Application for Licenses or Certificates.

All applications for licenses or certificates required by this regulation must be made to the state fire marshal in the manner required by this regulation.

1.303 Inspections.

Prior to issuing a license or certificate, the state fire marshal or his authorized representative may inspect vehicles, equipment, buildings, devices, premises, or any area to be used in performing the activities permitted by the license or certificate.

1.304 Compliance Required.

Licenses and certificates issued under this regulation are presumed to contain the requirement that the applicant, his agents, and employees carry out the permitted activity in compliance with all the requirements of law and this regulation.

Chapter IV

License and Registration

Portable Fire Extinguishers and Fixed Hood Systems

1.401 License Required.

No person may service or install a portable fire extinguisher or fixed hood extinguishing system unless licensed under the provisions of this regulation or otherwise excepted. Each licensee must be properly equipped and staffed by persons qualified under this regulation to perform the acts of service authorized by the type of license issued. Licenses and certificates of registration are not transferable and may be issued in any combination of the following types:

(a) Type A: All activities included in types B, C, and D.

(b) Type B: Service, charge, recharge, inspect, install, or any combination thereof.

(c) Type C: Hydrostatic testing of any fire extinguisher cylinders not listed by the United States Department of Transportation.

(d) Type D: Hydrostatic testing of any cylinders listed by the United States Department of Transportation.

(e) Type E: Certified for installation of pre-engineered fixed hood extinguishing systems.

A licensee may take orders for any acts of service for which he is not licensed provided the orders are actually completed by a person licensed to perform those acts.

1.402 Certificate of Registration Required.

No person other than a new employee may service portable or fixed fire extinguishing systems unless he has a certificate of registration issued by the state fire marshal and is employed by a licensee or a person exempt from license requirements as provided in Section 1.409 of this regulation. A certificate of registration is not transferable and may not be issued to anyone who has not attained the age of 18 years.

1.403 Approval of State Fire Marshal.

In addition to requirements of Section 1.402 of this regulation, any person who desires to engage in the installation, servicing, or inspection of a manufacturer's pre-engineered fixed hood extinguishing systems must be declared qualified to perform such act or acts by the state fire marshal. The state fire marshal may declare to be qualified a person who provides certification from a manufacturer of fixed hood extinguishing systems that he has received instruction and training in the installation, maintenance, servicing, and inspection of fixed hood extinguishing systems.

1.404 New Employees.

The provisions of Section 1.402 do not prohibit the servicing of portable fire extinguishers by new employees of a licensee for a period of not more than 90 days after the beginning of employment, if the servicing is conducted in the presence and under the direct supervision of a registrant. A new employee may not service portable fire extinguishers if after the completion of the 90-day period he fails to pass a written examination.

1.405 Hydrostatic Test Requirements.

Each person who performs hydrostatic testing of fire extinguishers manufactured in accordance with the specifications of the United States Department of Transportation must do so in accordance with the procedure specified by that department for compressed gas cylinders and must have a hydrostatic testing endorsement authorizing such testing issued by the state fire marshal and attached to the certificate or license.

1.406 Separate License Required.

A separate license is required for each business location.

1.407 Duplicate License or Certificate.

A duplicate license or certificate of registration may be issued to replace a license or certificate which has been lost or destroyed upon the submission of written statement from the licensee or the registrant to the state fire marshal attesting that the license or certificate of registration has been lost or destroyed. The prescribed fee must accompany the written statement for a duplicate license or certificate of registration.

1.408 Replacement of Extinguishers.

A licensee shall replace extinguishers removed from premises for servicing with spare extinguishers of equal or higher UL ratings during the period the extinguishers which are being serviced are removed.

1.409 Exceptions.

The provisions of Chapter IV of this article do not apply to:

(a) The filling or charging of a portable fire extinguisher prior to its initial sale by its manufacturer.

(b) A person who services only his own portable fire extinguishers for his own use by maintaining fire extinguisher facilities adequate for the purpose. This exception does not apply if the fire extinguishers are required by any statute, regulation, or ordinance, in which case the person servicing the required extinguishers must possess a certificate of registration.

1.410 Applications.

Application for a license or a certificate of registration must be made on forms prescribed by the state fire marshal. Each application must be accompanied by the required fee and contain the following information:

(a) Name and address of the applicant.
(b) Business address.
(c) Fictitious names used, if any.
(d) Type of work performed.
(e) Other pertinent information which the state fire marshal requires.

1.411 Examination.

Each applicant for a certificate of registration shall pass a written examination given by the state fire marshal in order to qualify for a certificate. The examination is divided into four parts. An applicant must receive a passing score on parts one and two before a certificate will be issued. The examination may be supplemented by practical tests or demonstrations necessary to determine the applicant's knowledge and ability to service portable fire extinguishers and fixed fire extinguishing systems. A certificate of registration endorsed with the type of qualification will be issued to each qualified person.

Information needed to pass the examination may be found in N.F.P.A. Number 10, Standard for the Installation, Maintenance, and Use of Portable Fire Extinguishers; this article; and the Fire Protection Handbook, Fourteenth Edition.

1.412 Date and Place of Examination.

When application for a license or a certificate of registration is made to the state fire marshal, he will set a date and place for testing of the applicant which is not more than 90 days after receipt of the application. Testing is available at the Carson City office of the state fire marshal at any time during normal working hours. Applicants traveling to Carson City for the purpose of testing must do so at their own expense.

1.413 Re-Examination.

An applicant who fails the written examination or any part thereof must wait 15 days from the date of his prior examination before retesting. A fee is charged for re-examination.

An applicant who fails part four of the written examination may be issued a Type B and C certificate of registration if he so desires. If at a later date the applicant wishes to reapply for a Type A certificate of registration, he must complete an application and pay the required fees as if the application were being made for the first time.

1.414 Hydrostatic Testing Information.

For hydrostatic testing information for DOT listed cylinders, reference may be made to Compressed Gas Association Pamphlet C-1, Methods for Hydrostatic Testing of Compressed Gas Cylinders.

Chapter V

License

Protective Signaling Systems and Automatic Sprinkler Systems (Commercial and Residential)

1.501 License Required.

No distributor or installer may service or install any fire alarm system or automatic sprinkler system unless licensed to do so under the provisions of this regulation. Each licensee must be properly equipped and staffed by personnel qualified to perform installation and service of fire alarm systems, automatic sprinkler systems or both.

1.502 Separate License Required.

A separate license is required for each business location.

1.503 Duplicate License.

A duplicate license may be issued to replace a license which has been lost or destroyed upon the submission of a written statement from the licensee to the state fire marshal attesting that the license has been lost or destroyed. The prescribed fee must accompany the written statement for duplicate license.

1.504 Application.

Application for a license must be made on forms prescribed by the state fire marshal. Each application must be accompanied by the required fee and contain the following information.

(a) Name and address of the applicant.
(b) Business address.
(c) Fictitious name used, if any.
(d) Type of work performed.
(e) Other pertinent information required by the state fire marshal.

Chapter VI

Fees

1.601 Fee Schedule—Portable Fire Extinguishers and Fixed Hood Systems.

(a) License with authorization to conduct hydrostatic tests of Department of Transportation listed and marked cylinders	$250
(b) License without authorization to conduct hydrostatic test of Department of Transportation listed and marked cylinders	200
(c) Authorization for installation of fixed hood extinguishing systems	50
(d) Certificate of registration	40
(e) Renewal fee for certificates of registration	20
(f) Re-examination fee for certificates	15
(g) Duplicate license or certificate	5
(h) Change of address or location on license	50

1.602 Fee Schedule—Protective Signaling Systems or Automatic Sprinkler Systems (Commercial and Residential).

License with authorization to design, install, maintain, and service fire alarm systems or automatic sprinkler systems (includes hydraulically designed system)	$250
Duplicate or amended license	5

Chapter VII

Renewals

Portable Fire Extinguishers and Fixed Hood Systems, Protective Signaling Systems and Automatic Sprinkler Systems (Commercial and Residential)

1.701 Expiration.

All licenses and certificates of registration expire on December 31 of the year in which they are issued. Application for renewal must be made annually on or before November 1. Renewal applications must be accompanied by the appropriate fee. A penalty of 50 percent of the renewal fee will be charged if the renewal fee is not paid on or before November 1.

If an application and the appropriate fee for renewal of a license or certificate of registration is void, then the firm or registrant holding the license or certificate of registration shall cease to perform those services authorized by the license or certificate of registration.

When a certificate of registration has expired and the registrant desires to continue to service portable fire extinguishers or fixed hood extinguishing systems, application must be made to the state fire marshal for an original certificate of registration in accordance with the regulations relating to applications for original certificates.

When a license has expired and the licensee desires to continue either in the business of servicing portable fire extinguishers or fixed hood extinguishing systems or installing or servicing fire alarm systems or fire sprinkler systems, application must be made to the state fire marshal for an original license as if application was being made for the first time. A penalty of 50 percent of the original fee will be charged in addition to the original fee.

Chapter VIII

Records Required

Protective Signaling Systems and Automatic Sprinkler Systems (Commercial and Residential)

1.801 Records.

Accurate records must be maintained by the licensee of all installations, service, and service agreements made by him.

1.802 License List.

The state fire marshal will keep a list of the names, addresses, and license numbers of all licensees. The record of all numbers will be available for inspection.

1.803 Change of Status Report.

Any change of location of licensee must be reported to the office of the state fire marshal in writing within 7 days after the change. A new license will be issued upon notification and payment of the prescribed fee.

Chapter IX

Denial, Revocation, and Suspension of Certificates and Licenses

1.901 Grounds.

The state fire marshal may refuse to issue or renew, or may suspend any certificate of registration or license if he determines that an applicant, licensee, or registrant has:

(a) Obtained or attempted to obtain a license or certificate or registration by fraud or misrepresentation.

(b) Been guilty of malpractice or incompetence in fire extinguisher sales or servicing, installation, servicing, or sales of fire alarm systems and automatic sprinkler systems.

(c) Advertised fire extinguisher sales or servicing, fire alarm systems and automatic sprinkler systems installation, servicing, or sales by means of known false or deceptive statements.

(d) Repeatedly failed to timely pay the annual renewal license or certificate of registration fees provided in these regulations.

(e) Violated any provision of the regulations adopted by the state fire marshal.

1.902 License and Certificate Ownership.

All licenses and certificates of registration remain the property of the state fire marshal and may not be suspended or revoked by any other person.

Chapter X

Division Hearings

1.1001 Investigation.

When the state fire marshal receives written notice or a complaint from any source alleging fraud, misrepresentation, malpractice, or incompetence on the part of any person licensed or certified under this regulation, he will conduct an investigation of the allegations. After the investigation is completed to the satisfaction of the state fire marshal and he has reviewed all the pertinent facts, he will give written notice to all interested parties stating his findings and intention to take action, if any.

1.1002 Investigative Hearings.

The state fire marshal may call involved parties to appear before him for an investigative hearing to determine just cause to set a formal administrative hearing for revocation or suspension of certificates of license pursuant to Chapter 233B of NRS.

The state fire marshal will give at least 10 days written notice to all involved parties of his intention to hold an investigative hearing. Notice of the hearing will be sent to the current address of involved parties on file with the state fire marshal division. Failure of a holder of a certificate or license to appear for a duly called investigative hearing is a violation of a provision of certification or licensing of that person and constitutes grounds for revocation or suspension of the license or certificate.

1.1003 Denial of Original or Renewal License or Certificate.

A person who has been denied an original or renewal license or certificate by the state fire marshal is entitled to a formal administrative hearing. The person may request an administrative hearing within 10 days after notice of denial. A written request must be sent to the state fire marshal. The state fire marshal, upon receipt of a request for an adminstrative hearing, will immediately take necessary action to schedule an administrative hearing. Failure on the part of an applicant to pass tests required in this regulation does not constitute grounds to request an administrative hearing.

1.1004 Administrative Hearings.

Administrative hearings will be conducted in accordance with Chapter 233B of NRS and subsection 5 of NRS 477.033.

1.1005 Entitlement.

Any person who has been denied a license or certificate by the state fire marshal is entitled to a hearing in accordance with the provisions of Chapter X of Article 1 of this regulation.

Any person who has a license or certificate suspended or is denied renewal by the state fire marshal is entitled to a hearing in accordance with the provisions of Chapter X of Article 1 of this regulation.

Chapter XI

Definitions

1.1101 General Provisions.

For the purposes of this regulation:

(a) The present tense includes the past and future tenses, and the future, the past.

(b) The masculine gender includes the feminine and neuter.

(c) The singular number includes the plural and the plural, the singular.

(d) If any provision of this regulation or the application thereof to any person or circumstances is held invalid, the remainder of the regulation, and the application of that provision to other persons or circumstances shall not be affected thereby.

1.1102 Definitions.

As used in this regulation, unless the context otherwise requires, the words and terms defined in Chapter XI of this regulation have the meanings ascribed to them.

1.1103 "Administrator" means the executive officer of a political subdivision.

1.1104 "Alarm Service" means the service required following:

(a) The manual operation of a fire alarm box;

(b) The transmission of an alarm indicating the operation of protective equipment or systems, such as an alarm from waterflow in a sprinkler system, the discharge of carbon dioxide, the detection of smoke, the detection of excessive heat; or

(c) The transmission of an alarm from other protective systems.

1.1105 "Alarm Signal" means a signal indicating an emergency requiring immediate action such as an alarm of fire from a manual box, a waterflow alarm, an alarm from an automatic fire alarm system, or other emergency signal.

1.1106 "Alter" and "Alteration" mean any change, modification, or deviation in construction or occupancy.

1.1107 "Annunicator" means a unit containing two or more identified targets or indicator lamps in which each target or lamp indicates the circuit, condition, or location annunciated.

1.1108 "Antifreeze System" means a sprinkler system employing automatic sprinklers attached to a piping system containing an antifreeze solution and connected to a water supply in which the antifreeze solution is followed by water from the water supply.

1.1109 "Approved" means that the state fire marshal has approved a practice or piece of equipment as the result of investigation and tests conducted under his supervision, or by reason of accepted principles or tests by national authorities or technical or scientific organizations recognized by the state fire marshal.

1.1110 "Assembly" means the gathering together of 50 or more persons in drinking or dining establishments, or 50 or more persons in any other place for any purpose.

1.1111 "Building" means any structure erected for the support, shelter, or enclosure of persons, animals, or property.

1.1112 "Building Official" means the official of the state or a political subdivision charged with the administration of a building code.

1.1113 "Certificate" and "Certificate of Registration" means a document issued by the state fire marshal to a person who has passed the prescribed tests which grants conditional permission to perform the acts described on the document.

1.1114 "Chief" means the chief officer of the fire department serving a jurisdiction or his authorized representative.

1.1115 "Chief of Police" means the chief law enforcement officer of a jurisdiction or his authorized representative.

1.1116 "Combination Paging Alarm System" means a fire alarm system designed to provide a general fire alarm and voice communication. The system may be used in whole or in part in common with another signaling system such as voice page or a musical program system if all components are of a type approved by the state fire marshal and the nonemergency system does not degrade the alarm and paging functions of the system.

1.1117 "Custodial Care Facility" means a building or a part of a building which is used for lodging or boarding four or more persons who are incapable of caring for themselves because of age or physical or mental limitations. The term includes facilities such as homes for aged, nurseries providing custodial care for children under six years of age, adult group care facilities, and facilities for the care of the mentally retarded. Day care facilities which do not provide lodging or boarding for institutional occupants are not covered in this definition.

1.1118 "Dry System" means a sprinkler system employing automatic sprinklers attached to a piping system containing air or inert gas under atmospheric or higher pressures in which loss of pressure from the opening of a sprinkler or detection of a fire condition causes the release of water into the piping systems and out through the opened sprinkler.

1.1119 "Dwelling" means any structure which contains one or two dwelling units intended to be used for human occupancy.

1.1120 "Dwelling Unit" means a single unit which has provisions for living and sleeping and which may provide for cooking and sanitation.

1.1121 "Fixed Hood System" means a fixed extinguishing system which is utilized in the hood and duct system over cooking equipment.

1.1122 "Governing Body" means:

(a) If a building is within a municipality, the governing body of that municipality;

(b) If a building is not within any municipality, the board of county commissioners of the county in which it is located; or

(c) If a building is located within Carson City, the Board of Supervisors.

1.1123 "Heating or Cooking Appliance" means any electric, gas, or oil-fired appliance not intended for central heating.

1.1124 "Hospital" means a building or a part of a building which is used for medical, psychiatric, obstetric, or surgical care on a 24-hour basis of four or more inpatients. The term includes general hospitals, mental hospitals, tuberculosis hospitals, hospitals for children, and all such facilities providing inpatient care.

1.1125 "Hydrostatic Testing" means a test under pressure of the required strength of a container by hydrostatic methods.

1.1126 "I.C.C. Container" means any container approved by the United States Interstate Commerce Commission for shipping any liquid, gas, or solid material of a flammable, toxic or other hazardous nature.

1.1127 "Inspection" means the handling and observation of a fixed hood system, portable fire extinguisher unit, fire sprinkler system or alarm system to check for damage to the system or unit which could preclude its functioning as designed. "Inspection" does not include actual manintenance.

1.1128 "Jurisdiction" means any county, city, town, district, or other political subdivision in the state.

1.1129 "License" means a document issued by the state fire marshal conditionally authorizing a person to engage in the business of, and receive a fee for, any of the following:

(a) Installation of protective signaling systems.

(b) Maintenance and service of protective signaling systems.

(c) Design of protective signaling systems.

"License" also means a document issued by the state fire marshal to a person who has satisfied the requirements which grants conditional permission to perform service, charging, maintenance, repair, installation, or hydrostatic testing of any approved portable fire extinguisher, fixed hood system, fire sprinkler system, or alarm system.

1.1130 "Maintenance" means repair service, including periodic inspections and tests, required to keep the protective signaling system and automatic sprinkler systems and their component parts in an operative condition at all times, together with replacement of the system or of their components when it becomes undependable or inoperative. "Maintenance" also means the disassembly of an extinguisher or extinguishing system, and a complete check of all working parts and all parts which have a bearing on the performance of the extinguisher or system, to insure their integrity.

1.1131 "N.F.P.A." means the National Fire Protection Association.

1.1132 "Nursing Home" means a building or a part of a building which is used for lodging, boarding, and nursing care on a 24-hour basis of four or more persons who, because of mental or physical incapacity, are unable to provide for their own needs and safety without assistance. The term includes convalescent homes, infirmaries operated by or for homes for the aged, and intermediate care facilities.

1.1133 "Owner" means a person who owns property and his duly authorized agent or attorney, a purchaser, devisee or fiduciary, and a person having a vested or contingent interest in the property.

1.1134 "Person" means a natural person, corporation, partnership, association, or other entity, public or private.

1.1135 "Pipe" as used in this regulation includes pipe and tubing.

1.1136 "Portable Fire Extinguisher" means any approved device capable of being moved from place to place which contains dry chemicals, fluids, or gases for the purpose of extinguishing fires and the means for application of its contents.

1.1137 "Pre-Engineered System" means a packaged system of components designed to be installed according to pre-tested limitations as listed by a nationally recognized testing laboratory, or as determined by the state fire marshal.

1.1138 "Protective Signaling System" means electrically operated circuits, instruments, and devices, together with the necessary electrical energy, designed to transmit fire alarms and supervisory and trouble signals necessary for the protection of life and property.

1.1139 "Protective Systems, Equipment or Apparatus" means automatic sprinklers standpipes, carbon dioxide systems, and other devices used for extinguishing fires and for controlling temperatures or other conditions dangerous to life or property.

1.1140 "Recharging" means emptying the extinguishing agent container, refilling with the appropriate extinguishing agent, charging the container with the appropriate propellant, and reasonable preventative maintenance to insure integrity.

1.1141 "Registrant" means a person who has been issued a cerificate of registration by the state fire marshal.

1.1142 "Restrained Care Facility" means a building or a part of a building which is used to house persons who are under restraint or security.

1.1143 "Service" and "Servicing" mean maintenance of portable fire extinguishers or fixed extinguishing systems in accordance with applicable adopted standards, including all charging, filling, recharging, refilling, repairing, installing, hydrostatic testing, and tagging. "Service" and "Servicing" also mean servicing of protective signaling systems and automatic sprinkler systems and components in accordance with adopted standards, and may include maintenance, installation, repairing, restoration, inspections, and tests.

1.1144 "Smoking" means the carrying or use of lighted pipe, cigar, cigarette, or tobacco in any form.

1.1145 "Sprinkler System" means an integrated system of piping connected to a water supply, including a controlling valve and a device for actuating an alarm when the system operates, with sprinklers which will automatically initiate water discharge over a fire area.

1.1146 "Supervisory Service" means the service required to assure the operating condition of automatic sprinkler systems and other systems for the protection of life and property.

1.1147 "Supervisory Signal" means a signal indicating the need of action in connection with the supervision of watchmen or of sprinkler and other extinguishing systems or equipment, or with the maintenance features of other protective systems.

1.1148 "System" means any assembly, electrical or mechanical, and all parts and portions connected to it.

1.1149 "Trouble Signal" means a signal indicating trouble of any nature, such as a circuit breaker or ground, occurring in the devices or wiring associated with a protective signaling system.

1.1150 "U.L." means Underwriters Laboratories, Inc.

1.1151 "Uniform Building Code" means the code published by the International Conference of Building Officials.

1.1152 "Uniform Fire Code" means the code published jointly by the Western Fire Chiefs and the International Conference of Building Officials.

1.1153 "Uniform Mechanical Code" means the code published jointly by the International Association of Plumbing and Mechanical Officials and the International Conference of Building Officials.

1.1154 "Uniform Plumbing Code" means the code published by the International Association of Plumbing and Mechanical Officials.

1.1155 "Wet System" means a system employing automatic sprinklers attached to a piping system containing water and connected to a water supply, in which water discharges immediately from sprinklers opened by a fire.

ARTICLE 2 PORTABLE FIRE EXTINGUISHERS AND FIXED HOOD SYSTEMS

Chapter I

Intent and Scope

2.101 Intent.

This article prescribes conditions of license and certification requirements for any person engaged in the sale, leasing, installation, or servicing of portable fire extinguishers and fixed hood systems in accordance with NRS 477.033.

2.102 Scope.

This article applies to all persons within, or conducting business within, the state unless specifically excepted.

This article applies to all portable fire extinguisher equipment and all fixed hood extinguishing systems required for the protection of cooking equipment unless specifically excepted.

Chapter II

Approved Equipment

2.201 Approval Required.

No portable fire extinguisher or component of a fixed fire extinguishing system may be sold or leased in this state unless it has been approved, labeled, or listed by Underwriters Laboratories, Inc., Underwriters Laboratories of Canada, Factory Mutual Laboratories, or other testing laboratories approved by the state fire marshal.

2.202 Prohibited Extinguishing Agents.

No portable fire extinguisher or fixed fire extinguishing system may be sold, leased, installed, or serviced in this state if it uses an extinguishing agent carbon tetrachloride, chlorobromomethane, methyl bromide, trichlortrifluoroethane or any other agent which has not been accepted by a laboratory approved under Section 2.201 of this article. Any accepted Halon system must be approved by the state fire marshal or his authorized representative. Plans for proposed Halon installations must be submitted to the state fire marshal or his authorized representative with the application for approval.

2.203 Inverted Extinguishers Prohibited.

Inverting type extinguishers may not be hydrostatically tested after January 1, 1977. Each such extinguisher which becomes due for hydrostatic test after that date must be permanently removed from service.

Chapter III

Equipment Service Requirements

2.301 Installation, Service, and Maintenance.
All installation, inspection, maintenance, and service of portable fire extinguishers and fixed hood extinguishing systems must be in accordance with the most current editions of N.F.P.A. Standards 10, 11, 11A, 11B, 12, 12A, 12B, 15, 16, 17, and 96 as amended.

2.302 Annual Service Required.
Regardless of exceptions contained in the applicable N.F.P.A. Standards, all portable fire extinguishers except the pressurized water type with pressure indicator gauges must be recharged at least annually, whenever the service seal has been broken, and whenever inspection indicates the extinguisher might fail to function.

2.303 Internal Maintenance Tag Required.
For the recharging of any dry chemical type of extinguishment cylinder to be valid, the serviceman must date and initial an approved self-sticking tag with the date and initials corresponding to the exterior service tag. The internal maintenance tag must be placed securely on the topmost exposed portion of the pick-up tube prior to reassembly and recharging. Failure to initial, date, and place an internal maintenance tag is grounds for suspension or revocation of a serviceman's certificate of registration.

Chapter IV

Annual and Interim Report Required

2.401 Annual Report.

The licensee shall report to the state fire marshal by November 1 of each year the name, address, and certificate number of each registrant in his employ as of October 1 of that year.

2.402 License and Certificate List.

The state fire marshal will keep a list of the names, addresses, and license and certificate numbers of all licensees and registrants.

2.403 Change of Status Report.

Each licensee shall within 10 days of employment report to the state fire marshal the name, address, and certificate number of each registrant and the name and address of each new employee who services portable fire extinguishers or fixed hood extinguishing systems. Each licensee shall report terminations of employment of registrants within 10 days. A change of address of any registrant must be reported by the registrant to the state fire marshal within 15 days after the change. The registrant shall record the new address on the reverse side of the certificate. Licensees and registrants who fail to report changes of address are subject to the penalties set forth in Section 1.901 of this regulation.

2.404 Change of Location Report.

Any change of location of a licensed firm must be reported to the state fire marshal in writing within 7 days of the change. A new license will be issued upon approval of the new location by the state fire marshal and the payment of the prescribed fee.

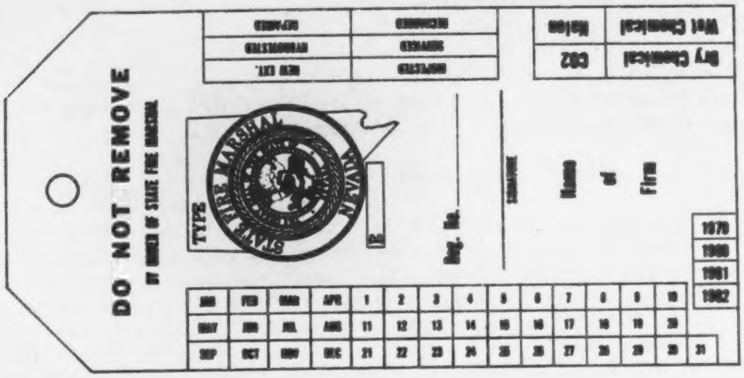
2.405 Records Available.

Reports required by this chapter are public records and may be inspected at the office of the state fire marshal.

Chapter V

Service Tags

2.501 Service Tags.
Fire extinguisher tags must be in the following form:


DO NOT REMOVE
BY ORDER OF STATE FIRE MARSHAL
TYPE
STATE FIRE MARSHAL
NEVADA
Reg. No.
SIGNATURE
Name of Firm
Wet Chemical
Halon
Dry Chemical
CO2
NEW EXT.
JAN FEB MAR APR
MAY JUN JUL AUG
SEP OCT NOV DEC
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31
1979
1980
1981
1982

2.502 Where Required.

The service tag must be attached to the extinguisher by means of wire, string, or plastic ties, or be a self-adhesive tag approved by the state fire marshal. Self-adhesive tags must be so attached as to be readily visible for inspection.

2.503 Hydrostatic Label Required.

A suitable Mylar or equally durable material label must be affixed by a heatless method to all extinguisher shells which are not listed by the United States Department of Transportation and which have passed a hydrostatic test. The label must include the following:

(a) The date on which the hydrostatic test was performed.
(b) The test pressure used.
(c) The name of person or agency performing the test.

Chapter VI

Fixed Hood Extinguishing System Requirements

2.601 Service Evidence.

The installer shall submit evidence of capability to provide for repair, recharging, and restoration of fixed hood extinguishing systems within 24 hours of notification of a fire or a fault in the system. Evidence of service capability is subject to approval by the state fire marshal and must include service equipment; qualified service personnel; the necessary stock of parts, products, and devices; and a valid license issued by the state contractors' board as well as the certification and approval of a major manufacturer of fixed hood extinguishing systems that is acceptable to the state fire marshal.

2.602 Maintenance Agreement Required.

(a) Where a fixed hood extinguishing system is required by any statute, regulation, or ordinance, a satisfactory agreement on the maintenance of the system, including the cleaning of both filters and ducts, must be provided. All systems, including filters and ducts, must be under the supervision of qualified persons approved by the state fire marshal.

(b) A copy of the maintenance agreement along with proof that the firm or company providing the maintenance is adequately covered by liability insurance must be provided by the firm or company to the local fire department having jurisdiction.

(c) A service tag conforming to the requirements of chapter V, section 2.501 shall be attached to all systems.

2.603 Installation.

Installation of fixed hood extinguishing systems must meet the applicable standards listed in section 2.301 of these regulations and any other applicable standards adopted by the state fire marshal and the local authority having jurisdiction.

2.604 Specifications, Plans, and Approvals.

(a) Detailed plans of fixed hood systems must be submitted to and approved by the local authority having jurisdiction.

(b) The specifications must state that the installation will conform to applicable standards listed in this regulation and meet the approval of the authority having jurisdiction.

(c) The specifications must include that a "bag" test of the system will be performed to the satisfaction of and witnessed by the authority having jurisdiction.

(d) Plans must be drawn to an indicated scale and must be made so that they can be easily reproduced.

(e) Plans must contain sufficient detail to enable the authority having jurisdiction to evaluate the effectiveness of the system.

(f) Plans must be submitted to and approved by the authority having jurisdiction before the work starts.

(g) Where field conditions necessitate any substantial change from the approved plan, the corrected (as built) plan must be submitted to the authority having jurisdiction for approval.

ARTICLE 3 PROTECTIVE SIGNALING SYSTEMS

Chapter I

Intent and Scope

3.101 Intent.

This article prescribes license requirements for persons engaged in the sale, leasing, installation, or servicing of protective signaling systems and components in accordance with NRS 477.033.

3.102 Scope.

(a) This article applies to all persons within or conducting business within the state unless specifically excepted.

(b) This article applies to all protective signaling systems and components installed within the state after the effective date of this regulation.

(c) This article does not apply to municipal fire alarm systems.

Chapter II

Approved Equipment

3.201 Approval Required.

No fire alarm system, fire alarm device, or component of any fire alarm system may be sold, leased, or installed in this state unless it is approved, labeled, or listed by Underwriters Laboratories, Inc., Underwriters Laboratories of Canada, Factory Mutual Laboratories, or other testing laboratories approved by the state fire marshal as qualified to test such systems or devices.

3.202 N.F.P.A. Compliance.

In addition to other provisions of these regulations, fire alarm systems must comply with one of the following N.F.P.A. standards:

(a) National Electrical Code (Article 760) N.F.P.A. 70.
(b) Central Station Protective Signaling Systems, N.F.P.A. 71.
(c) Local Protective Signaling Systems, N.F.P.A. 72-A.
(d) Auxiliary Protective Signaling Systems, N.F.P.A. 72-B.
(e) Remote State Protective Signaling Systems, N.F.P.A. 72-C.
(f) Proprietary Protective Signaling Systems, N.F.P.A. 72-D.

3.203 Detector to Comply.

Each class of detector must comply with the proper one of the following standards:

(a) N.F.P.A. 72-E Standard for Automatic Fire Detectors.
(b) U.L. Standard No. 217 for Photo Electric Type Detectors.
(c) U.L. Standard 217 for Ionization Type Detectors.
(d) U.L. Standard 539 for Single and Multiple Heat Detectors.

3.204 Listing to be Provided.

Where smoke detectors are required by any statute, regulation, or ordinance, evidence of approval must be furnished to the purchaser at the time of purchase or delivery. The evidence must be an unabridged copy of the approved smoke detector listings sheet issued by the state fire marshal.

Chapter III

Equipment Service Requirements

3.301 Service Evidence.

The distributor or installer shall submit evidence of capability to provide for repair and restoration of fire alarm systems within 24 hours of notification of a fire or fault in the system. Evidence of service capability is subject to approval by the state fire marshal and must include service equipment, qualified service personnel, the necessary stock of parts and devices, and a valid license issued by the state contractor's board, as well as the certification and approval of the manufacturer from whom the equipment is purchased.

3.302 Maintenance Agreement Required.

(a) Where fire alarm systems are required by any statute, regulation, or ordinance, a satisfactory agreement on the maintenance of the system must be provided. All systems must be under the supervision of qualified persons. These persons shall cause proper tests and inspections to be made at prescribed intervals and have general charge of all alterations and additions to the systems under their supervision.

(b) A copy of the maintenance agreement along with proof that the firm or company providing the maintenance is adequately covered by liability insurance shall be provided by the firm or company to the local fire department having jurisdiction.

(c) A service tag conforming to the requirements of this chapter, section 3.305 shall be attached to all systems.

3.303 Installation.

Installation of fire alarm equipment and systems must meet the standards listed in section 3.202 of these regulations and any other applicable standards and specifications adopted by the state fire marshal and the local authority having jurisdiction.

3.304 Specifications, Plans, and Approvals.

(a) Detailed plans of alarm systems must be submitted to and approved by the local authority having jurisdiction.

(b) The specifications must state that the installation will conform to applicable standards listed in this regulation and meet the approval of the authority having jurisdiction.

(c) The specifications must include the specific tests which may be required to meet the approval of the authority having jurisdiction.

(d) Plans must be drawn to an indicated scale or be suitably dimensioned and must be made so that they can be easily reproduced.

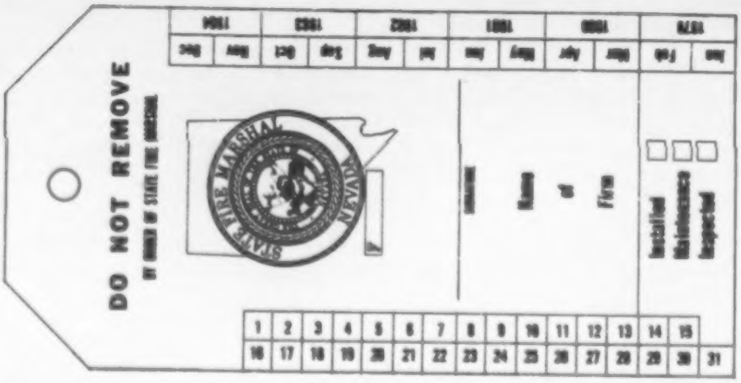
(e) Plans must contain sufficient detail to enable the authority having jurisdiction to evaluate the effectiveness of the system.

(f) Plans must be submitted to and approved by the authority having jurisdiction before the work starts.

(g) Where field conditions necessitate any substantial change from the approved plan, the corrected (as built) plan must be submitted to the authority having jurisdiction for approval.

3.305 Service Tag.

(a) Protective signaling system service tags must be in the following form:


1979
1980
1981
1982
1983
1984
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
DO NOT REMOVE
STATE FIRE MARSHAL
NEVADA
Name
of
Firm
Installed
Maintenance
Inspected
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(b) The service tag must be attached to the protective signaling system by the last person to work on the system for any purpose. The tag must be punched in an approved manner to indicate type of service performed on the system and the date. The service tag must be signed by the person doing the work.

Chapter IV

Combination Paging Alarm Systems

3.401 Equipment Criteria.

(a) Cone and horn type loudspeakers and line matching transformers employed in paging alarm systems must meet or exceed the following requirements:

(1) The horn or loudspeaker must be rated at a minimum wattage to provide coverage specified in subsection (a) of Section 3.402 of this regulation.

(2) The matching transformer must be rated at a minimum of twice the speaker load required wattage specified in subsection (a) of Section 3.402 of this regulation.

(3) Loudspeaker ratings will be calculated for the speaker as actually installed and used, with the backbox, grille, and matching transformer attached.

(4) Speakers must be housed in a metal backbox specifically designed for loudspeakers.

(5) Where applicable the speaker must be located near the initiating device.

(6) Loudspeakers, housings, horns, and similar devices which are used primarily for alarm devices must be red in color.

(7) Reentry horns mounted flush or on the surface must be used in hallways, mechanical rooms, and similar areas.

(8) Where surface speaker enclosures for two-way or one-way projection are permitted, they must be constructed of steel or aluminum and provide protection to the speaker. Tamper-proof mounting is recommended.

(9) Any areas with environmental conditions detrimental to cone type speakers must be provided with flush or surface horn type loudspeakers meeting minimum cone speaker requirements.

(10) Each sleeping room in a protected premises must be equipped with a loudspeaker.

(11) Alarm sounding devices must be U.L. listed for fire alarm use and application.

(12) A responsible person, such as the architect or design engineer, must establish that the alarm equipment meets the minimum standards set forth in this regulation.

(13) The responsibility for number and placement of loudspeakers to meet the requirements of Subsection (a) of Section 3.402 of this regulation is with the architect or designer.

(b) The amplification signal generating devices and supervising detection or monitoring equipment must meet current N.F.P.A. standards and the following requirements:

(1) Amplification equipment, tone generators, and associated equipment must be installed to provide a completely independent operating system. Each system must include a "fail-safe" panel which will monitor the sound system against opens, shorts, grounds, mechanical damage, and loss of power in all components while equipment is in use or on standby. Power amplifiers and signal generators must be designed with solid state circuitry, and be tested and approved for fire alarm use by a recognized testing laboratory, an agency approved by the state fire marshal, or both.

(2) The tone generator must emit a unique tone distinctive in sound and oscillation which will provide a disturbance pattern to awaken a sleeping person.

(3) When the supervisory panel has detected a fault, it must emit an audible and visual indication of system trouble. These signals must be indicated at all annunciator panels and at central control. Trouble indicators, wherever located, must include a silencing switch for the audio trouble indication. Trouble lamps may not be canceled until the equipment fault is corrected.

(c) Each system must include a central control panel provided with the following control features:

(1) The central control panel must have access to all voice communications systems, manual and automatic fire alarm panels, status indicators, and controls for elevators and air handling systems, controls for unlocking stairwell doors, a public telephone with a direct outside line, sprinkler valve and water flow indicators and standby controls.

(2) All cabinet or panel metalware must have been manufactured by a company regularly engaged in the manufacture of electrical or electronic type enclosures.

(3) Switching and annunciator panels must be segmented in groups with identical push-on, push-off back lit switches with each separate group clearly marked to identify the systems it controls.

3.402 Design Criteria.

(a) Areas to be protected by a paging alarm system must be covered with sufficient loudspeakers to achieve not less than 80 db of sound at any place within the protected property.

(b) Amplification equipment output load must not exceed 50 to 75 percent of its rated output for the entire system.

(c) The paging alarm system central control panel and annunciator panel must consist of selector switches, as previously specified, with one switch for each speaker zone. Zoning must be approved by the state fire marshal or local fire department having jurisdiction. The system must be capable of selective voice transmission by the use of one or more zone switches. One switch must be provided for calling all zones.

(d) The central control panel must include a power supply and associated equipment and circuitry for a telephone communication system. The telephone handset must be located at the panel. The fire department telephone communication system requirement may be satisfied by the installation of an internal telephone system, complete with handset at indicated locations, or the installation of jacks installed at the indicated locations and portable handsets stored at the central control station. A public telephone with a direct outside line must be provided at the central control panel.

(e) A paging microphone must be provided at each annunciator panel and central control panel. Keying the paging microphone button must mute all fire alarm signals and the fire alarm function must be automatically restored when the microphone is not in use. The fire department annunciator panel microphone must be capable of overriding all fire signals and the central control panel.

(f) General alarm capabilities must be available by manual switch at annunciator panels and the central control panel, and key operated from each manual pull station. The use of presignals from manual pull stations to management is permitted if management has an emergency procedure approved by the state fire marshal or the local fire department. The presignal system must be interconnected to an approved central receiving station where such services are available.

(g) Two or more annunciator panels must be provided. One annunciator panel must be provided for management in a location which is manned at all times. One annunciator panel must be located on the exterior of the building adjacent to the fire department standpipe or sprinkler connection, or in a location approved by the local fire department.

(h) The fire department annunciator panel must be of the same annunciator and switching design as the central control panel and be equipped with a monitor speaker. Access to the fire department control panel must be by common key lock acceptable to the local fire department.

(i) Keying a microphone at the central control panel or the fire department annunciator panel must automatically silence monitor speakers at that location.

(j) All system components including audio generating components (speakers or equivalent) must be continuously supervised and annunciated on all panels.

(k) When requested to do so by the fire department, the owner must perform and provide actual on-premises tests to demonstrate system operation and audio coverage specified in this section or certify thereto.

(l) An actual test of the system is required once each month. All equipment must be maintained in proper operating condition.

(m) Where cross-ventilation is not possible because of building design or air handling system design, controls for the ejection of smoke must be provided at the central control panel and fire department annunciator panel, including:

(1) Air supply (on-off).
(2) Exhaust (on-off).
(3) Detection (Override capability of automatic detection shutdown).

ARTICLE 4 AUTOMATIC SPRINKLER SYSTEM (Commercial)

Chapter I

Intent and Scope

4.101 Intent.

This article prescribes license requirements for any person who is engaged in the sale, leasing, installation, or servicing of commercial automatic sprinkler systems in accordance with NRS 477.033.

4.102 Scope.

This article applies to all persons within or conducting business within this state without restriction.

This article applies to all commercial sprinkler systems and components installed within this state after the effective date of this regulation.

Chapter II

Approved Equipment

4.201 Approval Required.

No automatic sprinkler system or component may be sold, leased, or installed in this state unless it has been approved, labeled, or listed by Underwriters Laboratories, Inc., Underwriters Laboratories of Canada, Factory Mutual Laboratories, or other testing laboratories approved by the state fire marshal as qualified to test such systems or components.

4.202 Compliance Required.

Automatic sprinkler systems must comply with the following N.F.P.A. standards and state regulations listed in this section:

(a) Installation of Sprinkler Systems, N.F.P.A. 13.
(b) Care and Maintenance of Sprinkler Systems, N.F.P.A. 13A.
(c) Standpipe and Hose Systems, N.F.P.A. 14.
(d) Water Spray Fixed Systems for Fire Protection, N.F.P.A. 15.
(e) Foam-Water Sprinkler Systems, N.F.P.A. 16.
(f) Article 3 of this regulation.
(g) Uniform Fire Code.
(h) Outside Protection, N.F.P.A. 24

Chapter III

Equipment Service Requirements

4.301 Service Evidence.

The distributor or installer shall submit evidence of capability to provide repair and restoration of automatic sprinkler systems within 24 hours of notification of a fire or fault in.the system. Evidence of service capability is subject to approval by the state fire marshal and must include lists of service equipment, qualified service personnel, the necessary stock of parts and devices, and a valid license issued by the state contractor's board as well as certification and approval of the manufacturer from whom the equipment is purchased.

4.302 Maintenance Agreement Requirement.

(a) Where automatic sprinkler systems are required by any statute, regulation, or ordinance, a satisfactory agreement on the maintenance of the system must be provided. All systems must be under the supervision of qualified persons. These persons shall cause proper tests and inspections to be made at prescribed intervals and must have general charge of all alterations and additions to the systems under their supervision.

(b) A copy of the maintenance agreement along with proof that the firm or company providing the maintenance is adequately covered by liability insurance shall be provided by the firm or company to the local fire department having jurisdiction.

(c) A service tag conforming to the requirements of this chapter, section 4.304 (m) and 4.305 shall be attached to all systems.

4.304 Specifications, Plans, and Approvals.

(a) Detailed plans must be submitted for approval of the local authority having jurisdiction.

(b) The specifications must state that the installation will conform to the applicable standards listed in this regulation and be approved by the authority having jurisdiction.

(c) The specifications must include the specific tests required to meet the standards for approval of the authority having jurisdiction.

(d) Plans must be drawn to an indicated scale or be suitably dimensioned, and must be made so that they can be easily reproduced.

(e) Plans must contain sufficient detail to enable the authority having jurisdiction to evaluate the effectiveness of the system.

(f) Plans must be submitted to the authority having jurisdiction before work starts.

(g) Where field conditions necessitate any substantial change from the approved plan, the corrected plan showing the system as installed must be submitted to the authority having jurisdiction for approval.

(h) Calculations must be established from the applicable sprinkler system design curve of Table 2-2.1 (B) of N.F.P.A. 13, Table 5-1.2 and 5-2.2 of N.F.P.A. 231, or Table 6-11.1 of N.F.P.A. 231C. Calculations must be computed from the water flow test that has been approved by the authority having jurisdiction.

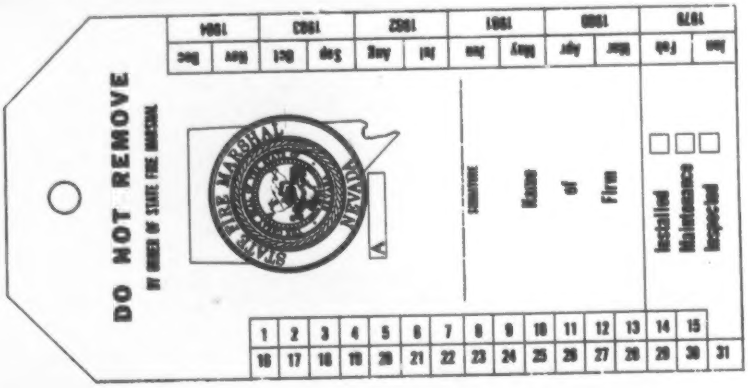
(i) All hydrostatic tests of systems and the flushing of underground systems must be witnessed by a representative of the authority having jurisdiction.

(j) The authority having jurisdiction must be notified 24 hours prior to any test so that the tests may be scheduled for witnessing.

(k) Upon completion of the installation of any fire sprinkler system, a letter of certification must be issued by the fire sprinkler contractor to the authority having jurisdiction. The letter must certify that the system has been installed in accordance with the original approved plans and all applicable national, state, and local codes.

(l) The installer shall properly identify all hydraulically designed fire sprinkler systems by a permanently attached placard indicating the location and number of sprinkler heads in the hydraulically designed system or sections and the discharge density over the designed area of discharge.

(m) The last person to work on a fire sprinkler system for any purpose shall attach a service tag, as required in Section 4.305 of this Article, to the OS & Y valve of the riser. The tag must be punched in an approved manner to indicate type of service performed on the system and the date. The service tag must be signed by the person doing the work.


DO NOT REMOVE
BY ORDER OF STATE FIRE MARSHAL
STATE FIRE MARSHAL
NEVADA
1979
1980
1981
1982
1983
1984
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Signature
Name of Firm
Installed
Maintenance
Inspected
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

4.305 Service Tag.

(a) Sprinkler system service tags must be in the preceding form.

(b) In the event the OS & Y valve is not electrically supervised, the service tag must serve as a seal for the valve.

(c) In the event the OS & Y valve is electrically supervised, the service tag must be attached in such a manner that the valve may be closed for testing of the supervision without removing the tag.

Chapter IV

Inspection and Maintenance

4.401 Frequency.

All automatic fire sprinkler systems must be inspected at least four times a year. One of the quarterly inspections must be termed an annual inspection and be conducted in accordance with the provisions of this chapter, Section 4.402. The other quarterly inspections may be conducted by any person, including an employee of a firm, who, in the opinion of the authority having jurisdiction, has sufficient knowledge of the system to conduct such an inspection.

4.402 Annual Inspections.

(a) Annual inspections must be made by a qualified automatic fire sprinkler contractor.

(b) The annual inspection must comply with the provisions of N.F.P.A. 13 and this regulation and include, without limitation, the following:

(1) Post indicator valves, underground gate valves, and OS & Y valves must be operated to make sure that they are in good operating condition and do not leak. Each control valve must be secured in its open position by means of a seal.

(2) Fire pumps must be started and operated until water is discharged freely from the relief valve and checked for ample pressure, proper supply of lubricating oil, operating condition of relief valve and level of water in priming tank.

(3) Fire department connections must be inspected, caps must be in place, threads in good condition, ball drip or drain in order, and check valve not leaking.

(4) Underground pipes connecting water supply to sprinkler system must be flushed with sufficient flow of water to remove any obstruction from the pipe lines.

(c) Wet system—alarm valves:

(1) Test alarms by opening the inspector's test connection, the by-pass test connection, or both, in conjunction with making a water flow test when facilities and conditions permit.

(2) Check cold weather valves and exposed piping to assure their proper conditions for winter and summer operations.

(3) Test the solution in anti-freeze system for satisfactory condition, as required in the Standard for the Installation of Sprinkler Systems (N.F.P.A. No. 13).

(d) Dry systems—dry valves, accelerators, etc.:

(1) Test the alarms, both water flow and air, if provided, and perform a water flow test through the drain connection when facilities and conditions permit.

(2) Check air pressure, priming water level, latching arrangements, automatic drip connections when provided, and the general condition of the dry pipe valves, accelerators or exhausters, and their environment, including dry pipe valve room or enclosures.

(3) Trip test dry pipe valves, together with accelerators and exhausters, if provided, in accordance with standard testing and reporting procedures required by the authority having jurisdiction.

(4) After testing, restore the system and the dry pipe valve to operation according to the manufacturer's instructions.

(5) Open condensation drains on drum drip connections and drain low points during fall and winter inspections.

4.403 Annual Inspection Report.

A copy of the annual inspection report must be sent to the authority having jurisdiction by the automatic fire sprinkler contractor conducting said inspection.

ARTICLE 5 AUTOMATIC SPRINKLER SYSTEM (Residential)

Chapter I

Intent and Scope

5.101 Intent.

This article prescribes license requirements for any person engaged in the sale, leasing, installation, or servicing of residential automatic sprinkler systems in accordance with NRS 477.033.

5.102 Scope.

(a) This article applies to all persons within or conducting business within this state without restriction.

(b) This article applies to all sprinkler systems and components installed after the effective date of this regulation within one and two family dwellings and mobile homes in this state.

Chapter II

Approved Equipment

5.201 Approval Required.

(a) Only new, listed sprinklers may be employed in the installation of sprinkler systems.

(b) No material or device which has not been approved by the state fire marshal or a testing laboratory recognized by the state fire marshal may be used in sprinkler systems.

(c) Pre-engineered sprinkler systems must be installed in accordance with the listing assigned to the system by a testing laboratory recognized by the state fire marshal.

(d) Pre-engineered systems may incorporate special materials, devices, method of installation, or design if approved by the state fire marshal.

(e) All systems must be tested for leakage for a minimum of one hour at a pressure not less than 50 percent above normal system operating water pressure.

Chapter III

Working Plans

5.301 Plans Required.

Working plans must be submitted to the authority having jurisdiction for approval before any equipment is installed or remodeled. Working plans must contain:

(a) The name of the company installing the system.

(b) The general location and exact address of the job location.

(c) A rough plot plan showing water supply and property lines in relation to the installation site.

(d) Water pressure at the installation site.

(e) A rough floor plan with system coverage indication.

(f) Any additional information required by the state fire marshal.

Chapter IV

Water Supply, Valves and Gauges

5.401 Water Supply.

(a) Water supply connections direct from city water mains or combination domestic—automatic sprinkler connections must be from an acceptable water supply source.

(b) When sprinkler systems are directly connected to a potable water supply, a check valve approved by the authority having jurisdiction must be installed on the discharge side of the control valve.

(c) Meters are not recommended for use in sprinkler systems.

(d) An elevated tank of at least 250 gallons capacity is an acceptable water supply source.

(e) A water source and automatic pump, which will supply a minimum of 25 gallons per minute flow, is an acceptable water supply source.

5.402 Valves and Drains.

(a) Each sprinkler system must have a water control valve located immediately on the discharge side of its water supply.

(b) Each sprinkler system must have a one-half inch or larger drain connection with valve on the system side of the control valve.

(c) Additional drains must be installed for each trapped portion of a dry system which is subject to freezing temperatures.

5.403 Gauges.

(a) A pressure gauge must be installed on the system side of the control valve on wet and antifreeze systems.

(b) A pressure gauge must be installed to indicate water supply pressure, and a second gauge must be installed to indicate air or inert gas pressure in dry systems.

Chapter V

System Design

5.501 Application Rate.

The minimum design density is 0.10 gallons per minute per square foot.

5.502 Water Demand.

The water demand for the system is 25 gallons per minute, or the area of the largest room in square feet multiplied by 0.10 and the result expressed as gallons per minute, whichever is less.

5.503 Sprinkler Coverage.

(a) Standard sprinklers mounted at the ceiling must be spaced so that the maximum area protected by a single sprinkler does not exceed 256 square feet in conventionally constructed dwelling units, and 100 square feet in mobile homes.

(b) The maximum distance between ceiling mounted sprinklers may not exceed 16 feet on or between pipe lines, and the maximum distance to a wall or partition may not exceed 8 feet.

(c) Sidewall sprinklers must be spaced so that the maximum area protected does not exceed 256 square feet in conventionally constructed dwelling units and 100 square feet in mobile homes.

(d) For sidewall sprinklers, the maximum distance between sprinklers mounted along the same wall may not exceed 16 feet. The maximum distance to an adjacent corner may not exceed 8 feet. The maximum projected throw may not exceed 16 feet in any case.

(e) Special sprinklers may be installed with larger protection areas or distances between sprinklers than those specified in Subsections (a) through (d) of this section when the installations are made in accordance with the listings of a testing laboratory recognized by the state fire marshal, or with approval of the state fire marshal.

5.504 System Types.

(a) A wet pipe system must be used when all piping is installed in areas not subject to freezing.

(b) Where system piping is located in unheated areas subject to freezing, a dry or antifreeze system must be used.

(c) Antifreeze systems must conform to state or local district health department regulations. Glycerine, diethylene glycol, ethylene glycol, propylene glycol, and similar materials may not be used in antifreeze solutions in water supply tanks.

5.505 Piping Types.

(a) Pipe or tube used in sprinkler systems must be made of the materials listed in Table 1 or in accordance with Subsections (b) through (g) of this section. The chemical properties, physical properties, and dimensions of the materials listed in Table 1 must be at least equivalent to the standards cited in the table and designed to withstand a working pressure of not less than 175 pounds per square inch (P.S.I.).

TABLE 1

Material and Dimensions	Standard
Ferrous Piping (Welded, Seamless Welded and Seamless Steel Pipe for Ordinary Uses, Specification for Black and Hot-Dipped Zinc Coated, Galvanized)	ASTM A120-72a

Specification for Welded and Seamless Steel Pipe	ASTM A53-72a
Wrought Steel Pipe	ASTM B3610-70a
Copper Tube (Drawn Seamless) Specification for Seamless Copper Tube	ASTM B75-72or
Specification for Seamless Copper Water Tube	ASTM B88-72
Specification for General Requirements for Wrought Seamless Copper and Copper Alloy Tube	ASTM B251-72
Brazing Filler Metal (Classification BCuP-3 or BCuP-4)	AWS A5.8-69
Solder Metal, 95-5 (Tin Antimony Grade 95TA)	ASTM B32-70

(b) Standard-wall schedule 40 pipe is permitted.

(c) Copper tube must have a wall thickness of Type K, L, or M.

(d) Other types of pipe or tube may be used, but only those listed for the purpose by a testing laboratory recognized by the state fire marshal, or those approved for use by the state fire marshal.

(e) Thin-wall steel pipe with a wall thickness of 0.120 inches may be joined with approved mechanical groove couplings and grooves rolled on the pipe by an approved groove rolling machine.

(f) Fittings used in sprinkler systems must be made of materials listed in Table 2 or approved in accordance with Subsection (c) of Section 5.506 of this regulation. The chemical properties, physical properties, and dimensions of the materials listed in Table 2 must be at least equivalent to materials which meet the standards cited in the table. Fittings used in sprinkler systems must be designed to withstand the working pressures involved, but not less than 175 P.S.I. cold water pressure.

TABLE 2

Material and Dimensions	Standard
Cast Iron—	
Cast Iron Screwed Fittings 125 and 250 lb.	ANSI B16.4-1971
Cast Iron Pipe Flanges and Flanged Fittings	ANSI B16.1-1967
Malleable Iron—	
Malleable Iron Screwed Fittings 150 and 300 lb.	ANSI B16.3-1971
Steel—	
Factory-Made Wrought Steel Buttweld Fittings	ANSI B16.9-1961
Buttwelding Ends for Pipe, Valves, Flanges, and Fittings	ANSI B16.25-1972
Specification for Piping Fittings of Wrought Carvon, Steel and Alloy Steel for Moderate and Elevated Temperatures	ASTM A234-73
Steel Pipe Flanges and Flanged Fittings	ANSI B16.5-1973
Forged Steel Fittings Socket Welded and Threaded	ANSI B16.11-1973
Copper—	
Wrought Copper and Bronze Solder Joint Pressure Fittings	ANSI B16.22-1973
Cast Brass Solder Joint Fittings	ANSI B16.18-1972

5.506 Copper Tube Joints.

(a) Joints for the connection of copper tube must be brazed except in wet-pipe copper tube systems.

(b) Soldered or brazed joints may be used for wet-pipe copper tube systems.

(c) Other types of fittings may be used if listed for this purpose by a testing laboratory recognized by the state fire marshal or approved for this use by the state fire marshal.

5.507 Pipe Sizing.

(a) The required size for sprinkler piping must be determined in accordance with this Section and Section 5.508, unless the piping has been hydraulically calculated to achieve the design density specified in Section 5.501. When piping is sized hydraulically, calculations must be made in accordance with the methods described in N.F.P.A. Standard Number 13. The minimum pipe size for use in sprinkler systems is ¾ inch.

(b) To determine the size of piping for systems connected to a city water supply and fitted sprinklers with half inch orifices, the following approximate method is acceptable:

(1) Determine water pressure in the street.
(2) Arbitrarily select pipe sizes.
(3) Deduct meter losses, if any.
(4) Deduct loss for elevation (building height in feet × 9.434 = P.S.I.).
(5) Deduct losses from street to control valve by multiplying the factor from Table 3 by the total length of pipe in feet.

TABLE 3

Design Factors (P.S.I. Ft.) with 25 G.P.M. Flow

Pipe Size, Inches	Steel (C = 120)	Copper (C = 140)
¾	0.64	0.52
1	0.20	0.14
1¼	0.05	0.05
1½	0.02	0.02
2	0.008	0.004

(6) Deduct losses for piping within the building by multiplying the factor from Table 3 by the total length in feet of each size of pipe between the control valve and the farthest sprinkler.

(7) Deduct valve and fitting losses. Count the valves and fittings from the control valve to the farthest sprinkler. Determine the equivalent length for each valve and fitting as shown in Table 4 and add these values to obtain the total equivalent length for each pipe size. Multiply the equivalent length for each size by the factor from Table 3 and total these values.

(8) In buildings with more than one story or level, steps 1 through 6 must be repeated to determine the required pipe size for each floor.

(9) If the remaining pressure is less than 20 P.S.I., pipe or meter size must be increased. If the remaining pressure is substantially greater than 20 P.S.I., it may be possible to decrease piping or meter size.

(10) The size of the remaining piping must be determined in the same manner as the piping to the farthest sprinkler unless smaller sizes are justified by calculations and approved by the authority having jurisdiction.

5.508 Pipe Sizing Other than City Supply.

To determine the proper size of piping for systems with an elevated tank, pump, or pump-tank combination, determine the pressure at the water supply outlet and proceed through steps 2, 4, 6, 7, 8, 9 and 10 of 5.507 (b).

TABLE 4

Equivalent Length of Pipe in Feet for Fittings and Valves

Fitting/Valve Diameter Inches	Elbows			Tees		Valves					
	45 Degrees	90 Degrees	Long Radius	Flow Thru Branch	Flow Thru Run	Gate	Angle	Globe	Globe "Y" Pattern	Cocks	Check
¾	1	2	1	4	1	1	10	21	11	3	3
1	1	3	2	5	2	1	12	28	15	4	4
1¼	2	3	2	6	2	2	15	35	18	5	5
1½	2	4	3	8	3	2	18	43	22	6	6
2	3	5	3	10	3	2	24	57	28	7	8

Based on Crane Technical Paper No. 410.

TABLE 5

Pressure Drop in Meters

Meter Size (Inches)	Pressure Loss at 25 gpm (psi)
5/8	28.0
3/4	10.0
1	3.6
1 1/2	1.2
2	Less than 1.0
3	Negligible

5.509 Piping Configurations.

Piping configurations may be looped, gridded, straight run, or combinations thereof.

5.510 Piping Support.

(a) Piping must be supported from structural members of adequate size to support it. Hanging methods must be comparable to those used in the most recently adopted uniform plumbing code.

(b) Piping laid on open joists or rafters must be strapped or secured in a manner to preclude lateral movement.

5.511 Sprinkler Heads.

(a) The use of ordinary (135°-170°F.) and intermediate (175°-225°F.) temperature rated sprinklers is permitted.

(b) Intermediate temperature heads must be used in attics, furnace rooms, and elsewhere where normal ambient air temperatures may exceed 100°F. Ordinary temperature heads must be used in all other areas.

(c) All sprinkler heads in a building must have the same orifice size unless the system is hydraulically calculated and approved by the authority having jurisdiction.

5.512 Sprinkler Location.

Sprinklers must be installed in all areas, unless omitted from some areas upon written approval of the authority having jurisdiction.

5.513 Waterflow Alarm.

Sprinkler systems must be provided with a waterflow detecting device approved by the state fire marshal and arranged to sound an alarm which will be audible in all living areas over background noise levels with all intervening doors closed. The alarm must be designed to function even if there is an interruption of normal electrical service.

5.514 Additional Requirements.

The authority having jurisdiction may require additional plans, documentation of testing data, engineering specifications, and equipment when it judges that it is necessary.

ARTICLE 6 CLASSIFICATION OF HEALTH CARE FACILITIES

Chapter I

Intent and Scope

6.101 Intent.
This article prescribes classifications for health care facilities to provide a basis for code approval of licensing pursuant to NRS 477.030 and chapter 449 of NRS.

6.102 Scope.
This article applies to all health care facilities in this state.

Chapter II

Classifications

6.201 Institutional Occupancies.

Institutional buildings are those used for purposes such as medical or other treatment or care of persons suffering from physical or mental illness, disease or infirmity; for the care of infants, convalescents, or aged persons; and for penal or corrective purposes. Institutional buildings provide sleeping facilities for the occupants and are occupied by persons who are incapable of caring for themselves because of age, physical or mental disability, or because of security measures not under the occupants' control.

6.202 Institutional Occupancy Groups.

Institutional occupancies are divided into three groups for the purpose of identification and classification:

(a) Health care facilities, including hospitals, nursing homes, and intermediate care facilities.

(b) Custodial care facilities.

(c) Restrained care facilities

ARTICLE 7 HISTORIC OR ARCHITECTURALLY SIGNIFICANT BUILDINGS

Chapter I

Intent and Scope

7.101 Intent.

This article prescribes methods for the restoration of historic or architecturally significant buildings in a manner which, without requiring full compliance with current codes, will include consideration for the safety of property and life in accordance with NRS 477.030.

7.102 Scope.

This article applies to all historic or architecturally significant buildings designated under this article within this state.

Chapter II

Qualification

7.201 Means for Qualification.

The means by which a building may be qualified and become subject to this article are:

(a) An application designating the building by name and address must be submitted by the legal owner to the governing body of the area in which the building is located.

(b) The application must include justification to the satisfaction of the governing body that the building is of historic or architectural significance.

(c) The application must include plans or descriptions of the proposed restoration as the governing body requires.

(d) Certification of a building's historic or architectural significance must be obtained from the division of historic preservation and archeology of the department of conservation and natural resources.

Chapter III

Approval

7.301 Local Approval.

The governing body may, after reviewing all pertinent facts including established criteria to determine the historic or architectural significance of a building, indicate by resolution addressed to the state fire marshal that the building in question qualifies in their opinion as a building of historic or architectural significance, and ask that it be so designated.

7.302 State Approval.

(a) Upon receipt of resolution from a governing body and certification from the division of historic preservation and archeology of the department of conservation and natural resources, the state fire marshal will investigate the building in question and prepare a document of requirements showing equipment and building construction required to ensure reasonable safety of property and life.

(b) The state fire marshal will then cause a hearing to be held before the state fire marshal's advisory board. All interested parties including the state fire marshal, the state historic preservation officer, and the legal owner of the building may be present.

(c) After hearing all pertinent facts and reviewing the document of requirements, the state fire marshal's advisory board may issue an order listing all provisions of restoration.

Chapter IV

Restoration

7.401 Plans Required.

(a) Three complete sets of architectural plans showing required structural calculations and encompassing all advisory board provisions of restoration must be submitted to the state fire marshal for review and approval.

(b) After review, if he approves the plans, the state fire marshal will retain one set of the approved plans and submit two sets to the local building official.

7.402 Building Permit.

(a) Upon receiving the plans from the state fire marshal, the local building official shall issue a building permit at the local permit fee schedule plus 10 percent. The 10 percent surcharge on the fee schedule must be remitted to the state fire marshal by the local building official.

(b) If there is no local building permit fee schedule, a fee in accordance with table No. 3-A of the 1976 edition of the uniform building code must be submitted to the state fire marshal when the original plans are submitted by the contractor. The state fire marshal will then remit the fee less 10 percent to the governing body.

7.403 Construction.

All construction must be done by a contractor licensed by the state contractors' board and must conform to the approved plans.

7.404 Inspections.

All inspections for compliance with the approved plans must be made by the local building official, and at his request, the state fire marshal will provide assistance.

Chapter V

Final Approval

7.501 Certificate of Occupancy.

Upon completion of construction and after all final approvals by the local building official and the state fire marshal, the state fire marshal will issue a certificate of occupancy listing any special conditions of occupancy.

7.502 Posting of Certificate of Occupancy.

The certificate of occupancy must be conspicuously posted on the premises in view of the public at all times.

Chapter VI

Article Limitations

7.601 Permits, Licenses, Etc.

Nothing in this article supersedes local requirements for business licenses, permits, or other documents required by the governing body for the building to be used for commercial purposes.

ARTICLE 8 ADOPTED CODES

Chapter I

Adopted Codes Listing

8.101 General.

The following nationally recognized codes are hereby adopted by the state fire marshal, with additions and deletions as noted in chapters II, III, IV, and V of this article.

(a) 1967 and 1973 Edition, N.F.P.A. 101 Life Safety Code.
(b) 1976 Edition, Uniform Fire Code.
(c) 1976 Edition, Uniform Building Code.
(d) 1976 Edition, Uniform Building Code Standards.
(e) 1976 Edition, Uniform Mechanical Code.
(f) 1976 Edition, Uniform Plumbing Code.
(g) 1978 Edition, National Electrical Code.

8.102 National Fire Codes.

In addition to the adopted codes, the state fire marshal hereby adopts the 1978 Edition, N.F.P.A. National Fire Codes as nationally recognized standards of good practice to supplement the other adopted codes and this regulation. In the absence of specific code requirements in the other adopted codes, the state fire marshal will interpret application of the National Fire Codes.

Chapter II

Additions, Deletions: U.F.C.

8.201 General.

The following additions and deletions are part of the state fire marshal's adoption of the 1976 Edition of the Uniform Fire Code:

(a) Section 1.215 deleted.

(b) Section 1.216 add: Gypsum Association, 201 N. Wells St., Chicago, IL 60606.

(c) Section 13.316 add: All buildings erected within the state after the effective date of the state fire marshal regulation, which are taller than 75 feet above grade at any point, must be equipped throughout with approved automatic fire sprinkler systems. Sprinkler systems must be installed in accordance with N.F.P.A. Standard 13.

(d) Article 20 deleted. Add: Liquefied petroleum gases must be stored, handled, and transported in accordance with the regulations of the Nevada liquefied petroleum gas board and N.F.P.A. Standard 58.

Chapter III

Additions, Deletions: U.B.C.

8.301 General.

The following additions and deletions are a part of the state fire marshal's adoption of the 1976 Edition of the Uniform Building Code:

(a) Section 204 deleted.

(b) Section 303 deleted. Add: Fees may be set by the governing body of the city or county.

(c) Section 3802 (b) add subsection 12: All buildings erected after the adoption of the state fire marshal regulations within this state, which are taller than 75 feet above grade at any point, must be equipped throughout with approved automatic fire sprinkler systems. Sprinkler systems must be installed in accordance with N.F.P.A. Standard 13.

(d) Section 1807 (g) add: The central control station must be housed in a room separated from the building in which it is located by a minimum of two-hour, noncombustible construction. The central control station room must be served by an exterior door whenever possible.

Chapter IV

Additions, Deletions: U.B.C. Standards

8.401 General.

The following addition and deletion is a part of the state fire marshal's adoption of the 1976 Edition of the Uniform Building Code Standards:

(a) Standard 38-1 deleted. Add: Automatic fire extinguishing systems must be installed in accordance with N.F.P.A. Standard 13.

Chapter V

Additions, Deletions: U.M.C.

8.501 General.

The following addition and deletion is a part of the state fire marshal's adoption of the 1976 Edition of the Uniform Mechanical Code:

(a) Section 1009 deleted. Add: Smoke detectors must be installed in accordance with N.F.P.A. Standard 90A.

Appendix III

January 19, 1981

The Honorable Robert List, Governor
State of Nevada
Capitol Complex
Carson City, Nevada 89710

Dear Governor List:

The executive order that you issued creating the Commission on Fire-Safety Codes charged us with three primary duties. We, the aforementioned Commission, are pleased to report the discharge of the first of those duties.

After consideration of all available relevant materials, it is the unanimous finding of the Commission that the present code structure of Nevada, relative to new construction of the highrise buildings, is consistant with the most stringent in the United States and has been so since 1978. The various code authorities on the Commission unanimously agree that Nevada's mandatory sprinkler requirement, along with other adopted regulations and codes, clearly substantiate that Nevada is in a place of national leadership in terms of fire-safety protection in new highrise construction.

The present codes and regulations governing public assembly occupancy spaces in the State of Nevada compare very favorably with other leading states throughout the nation. This comparison is supported by the fact that most states conduct their fire-safety requirements based on the model building code and the N.F.P.A. life safety code. A full range of model codes have been adopted in the State of Nevada to deal with all aspects of fire building safety. However, as a commission, we have determined that specific areas in the codes governing public assembly occupancy spaces require improvement. The Commission has drafted proposals aimed at improving the safety factors in all new construction of public assembly occupancies and other buildings. These proposals have been distributed throughout the nation to concerned organizations and knowledgeable individuals for their comments. Final recommendations pertaining to the Commission's proposals to expand the 1979 codes will be presented to you in a final report.

As you are aware, the new codes and state regulations adopted in 1978 do not apply to existing buildings erected prior to the adoption. The Commission is currently considering the question of retro-fitting of those existing buildings and will finalize a report to you prior to the March 1 deadline.

Very truly yours,

Kenny C. Guinn, Chairman
Governor's Commission on Fire-Safety Codes

KCG:pj
cc: Commission Members

Appendix IV

STATE OF NEVADA
STATE FIRE MARSHAL DIVISION
CAPITOL COMPLEX
CARSON CITY, NEVADA 89710

ROBERT LIST
GOVERNOR

JAMES L. WADHAMS, DIRECTOR
DEPARTMENT OF COMMERCE
T. J. HUDDLESTON, FIRE MARSHAL
STATE FIRE MARSHAL DIVISION
(702) 885-4290

January 6, 1981

Gentlemen:

As you may be aware, Governor Robert List of Nevada appointed a nine member commission on Firesafety Codes in the wake of the recent Las Vegas M.G.M. fire. Part of the charge of that commission is to review current model codes to see if they can be made even stronger in dealing with fire and lifesafety. Attached is a listing of suggested changes to the 1979 Edition of the Uniform Building Code currently being considered by the Commission. You, along with other code authorities and industry representatives are requested to review and comment on these proposals. All comments should be sent to me:

T.J. Huddleston
Nevada State Fire Marshal
Capitol Complex
Carson City, Nevada 89710

The commission will prepare it's final report by not later than the middle of February, I would appreciate hearing from you as soon as possible. On behalf of Governor Robert List and the Commission, thank you in advance for your participation. If I can be of any assistance please contact me at (702) 885-4290.

Very Truly Yours,

Huddleston

T.J. Huddleston
Nevada State Fire Marshal

TJH:jj

Following are proposed modifications to the 1979 edition of the Uniform Building Code as agreed on by the Nevada Governor's Commission on Fire Safety Codes:

1807(a) Scope. This section shall apply to all Group B, Division 2 office buildings and Group R, Division 1 occupancies, each having floors used for human occupancy located more than 55 feet or five stories above the lowest level of fire department vehicle access. Such buildings shall be provided with an approved automatic sprinkler system in accordance with Section 1807(c).

1807(b) Certificate Of Occupancy. Add the following sentences: "All such equipment shall be tested quarterly by an approved agency. All life safety equipment shall be reset and certified by an approved agency after having been actuated. A log of such tests shall be kept available for inspection by the building designer and approved by the building official."

1807(e) Alarm and Communication System. Retain the present subsection but with (2) modified to be consistent with the present fire marshal requirements which refers to an 80 decibel level of sound at all points within the protected property.

1807(f) Central Control Station. Retain the present subsection but with further modification as currently in the fire marshal requirements which calls for the central control station to be separated from the remainder of the building by 2-hour fire-resistive construction and to have a door to the exterior whenever possible.

1807(h) Delete the present section and substitute a requirement that elevators shall be installed in compliance with ANSI A17.1-1978 with the 1981 amendments. Then add the following sentence:

"All elevators on all floors shall open into elevator lobbies which are separated from the remainder of the building, including corridors, as is required for corridor construction in Section 3304(g) and (h)."

1807(j) Modify (1) by adding at the end of the present sentence "sprinkler operation or power failure."

Modify (3) by changing the figure 0.15 to 0.25 in 3rd line.

Section 3802(b)2B Modify to read:

"Every casino, showroom and other assembly room of more than 5,000 square foot area."

EXCEPTION: Churches and theatres having only fixed seating.

Section 3802(c) Add a new Item B under (1) and redesignate the existing Items B, C, and D. The new Item B is to read as follows: "in buildings over two stories in height."

LIST TO WHICH THE PROPOSED CHANGES TO THE 1979 UNIFORM BUILDING CODE WERE DISTRIBUTED FOR COMMENT

Joe Sacco
Office of State Fire Marshal
7171 Bowling Drive, Suite 800
Sacramento, California 95823

I.C.B.O.
5360 S. Workman Mill Road
Whittier, California 90601

Neil Houghton, Building Owner and Manager
3350 N. Central Avenue
Phoenix, Arizona 85012

American Iron & Steel Inst.
J. C. Spence
1000 Sixteenth Street, N.W.
Washington, D.C. 20036

CA Lathing & Plastering Contractors Association
Clay M. Johnston
25332 Narbourne Avenue, No. 170
Lomita, California 90717

Drywall Industry Trust Fund
Robert Gulick
9800 S. Sepulveda Boulevard
Los Angeles, California 90045

Gypsum Association
Marvin Smith
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Hollywood, California 90028

National Automatic Sprinkler Association
Ed Reilly
P.O. Box 719
Mt. Kisko, New York 10549

National Forest Products Assoc.
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P.O. Box 4012
Mt. View, California 94040

Portland Cement Association
Jim Barris
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Edward P. DeLorenzo Architect
3101 Maryland Parkway, Suite 112
Las Vegas, Nevada 89109

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Phoenix, Arizona 85004

John Russell, Vice-Pres. and District Manager
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William E. Snyder, Arch.
1555 E. Flamingo Road, No. 440
Las Vegas, Nevada 89109

Appendix V

Rule 211.3 Operation of Elevators Under Fire or Other Emergency Conditions:

All elevators having a travel of 25 feet (7.62m) or more, above or below the designated level (see Section 3-Definitions), shall conform to the following:

211.3 Phase I and II Operation

1. Phase I Emergency Recall Operation
   a. A three-position (on, off and by-pass) key-operated switch shall be provided only at the designated level for each single elevator or for each group of elevators. The key shall be removable in the "on" and "off" positions.

   When the switch is in the "off" position, normal elevator service shall be provided and the smoke detectors required by Rule 211.3a-1-b shall be functional. When the switch is in the "bypass" position, normal elevator service shall be restored independent of the smoke detectors required by Rule 211,3a-1-b.

   When the switch is in the "on" position:
   (1) All cars controlled by this switch and which are on automatic service shall return nonstop to the designated level and the doors shall open and remain open.
   (2) A car traveling away from the designated level shall reverse at or before the next available floor without opening its doors.
   (3) A car stopped at a landing shall have the in-car emergency stop switch rendered inoperative as soon as the door is closed, and the car starts toward the designated level. A moving car, traveling to or away from the designated level, shall have the in-car emergency stop switch rendered inoperative immediately.
   (4) A car standing at a floor other than the designated level, with doors open and the in-car emergency stop switch in the run position, shall conform to the following:
      (a) Elevators having automatic power-operated horizontally sliding doors shall close the doors without delay and proceed to the designated level.
      (b) Elevators having power-operated vertically sliding doors provided with automatic or momentary pressure closing operation per Rule 112.3d shall have the closing sequence intitiated without delay in accordance with Rule 112.3d(1), (2), (3) and (5) and the car proceed to the designated level.
      (3) Elevators having power-operated doors provided with continuous pressure closing operation per Rule 112.3b or elevators having manual doors, shall confrom to the requirements of Rule 211.33. Sequence operation , if provided, shall remain effective.

(5) Door reopening devices for power-operated doors which are sensitive to smoke or flame shall be rendered inoperative. Mechanically actuated door reopening devices not sensitive to smoke or flame shall remain operative. Door closing shall conform to the requirements of Rule 112.3.

(6) All car and corridor call buttons and all corridor door opening and closing buttons shall be rendered inoperative and all call registered lights and directional lanterns shall be extinguished and remain inoperative. Position indicators when approved, shall remain in service.

(7) All cars shall be provided with a visual and audible signal system which shall be activated to alert the passengers that the car is returning nonstop to the main floor or other designated level.

b. Smoke detectors shall be installed in accordance with NFPA No. 722, Automatic Fire Detectors, Chapter IV, in each elevator lobby at each floor and associated elevator machine rooms. The activation of a smoke detector in any elevator lobby or associated elevator machine rooms other than the designated level, shall cause all cars in all groups that serve that lobby to return nonstop to the designated level. If the smoke detector at the designated level is activated, the cars shall return to an alternate level approved by the enforcing authority unless the Phase 1 key-operated switch (Rule 211.3a-1-a) is in the "on" position. Smoke detectors and/or smoke detector systems shall not be self resetting. The operation shall conform to the requirements of Rule 211.3a(1)(a).

Exception (Rule 211.3a(1)(b)): Elevator lobbies at unenclosed landings.

2. Phase II Emergency In-Car Operation

a. A two-position (off and on) key-operated switch shall be provided in or adjacent to an operating panel in each car, and it shall become effective only when the designated level Phase I key-operated switch (Rule 211.3a-1-a) is in the "on" position or a smoke detector (Rule 211.3a-1-b) has been activated, and the car has returned to the designated level. The key shall be removable only in the "off" position. When in the "on" position, it shall place the elevator on emergency in-car operation.

The operation of elevators on Phase II emergency in-car operation shall be by trained emergency service personnel only and shall be as follows:

(1) An elevator shall be operable only by a person in the car.

(2) All corridor call buttons and directional lanterns shall remain inoperative.

(3) The opening of power-operated doors shall be controlled only by continuous pressure "open" buttons or switches. If the switch or button is released prior to the doors reaching the fully open positon, the doors shall automatically reclose. Open doors shall be closed by either the registration of a car call or by pressure on "Door Close" switch or button.

(4) Door reopening devices rendered inoperative per Rule 211.3a (1)(a)(5) shall remain inoperative.

(5) Means shall be provided to cancel registered car calls.

(6) Elevators shall only be removed from Phase II operation by moving the emergency key-operated switch in the car to the "off" position with the car at the designated or alternate level.

3. Multi-Deck Elevators
Multi-deck elevators shall conform to the requirements of Rules 211.3a-2 and 4 and to the additional requirements as follows:

a. The Phase I key-operated switch in the car required by Rule 211.3a-2 for emergency service operation shall be located in the top deck. The elevators shall be provided with means for placing the lower deck out of service shall be located in that deck or adjacent to the entrance at the lower lobby floor.

4. Switch Keys
The switches required by Rules 211.3a-1 and 211.3a-2 shall be operable by the same key but which is not a part of a building master key system. There shall be a key for the designated level switch and for each elevator in the group. These keys shall be kept on the premises in a location readily accessible to authorized personnel, but not where they are available to the public.

NOTE: (Rule 211.3a(4)) Local authorities may specify a uniform key or key security for their jurisdiction.

211.3b Designated Attendant-Operated Elevators

Elevators operable only by a designated attendant in the car shall be provided with a visual and audible signal system conforming to the requirements of Rule 211.3a-1-a-(7), than shall be activated when the key-operated switch required by Rule 211.3a(1)(a) is in the "on" position or when a smoke detector required by Rule 211.3a-1-b has been activated to alert the attendant to close the doors and return nonstop to the designated level.

211.3c Elevators Arranged for Dual Operation

Elevators arranged for dual operation, shall, when on automatic operation, conform to the requirements of Rule 211.3a. When operated by a designated attendant in the car, elevators shall conform to the requirements of Rule 211.3b. When the doors are closed and the car is in motion, the elevator may conform to the requirements of Rule 211.3a.

211.3d Inspection Operations

When an elevator is on inspection operation, a continuous audible signal which is audible on top of the car shall sound when the Phase I key-operated switch (Rule 211.3a-1-a) or a smoke detector required by Rule 211.3a-1-b is actuated to alert the operator of an emergency. Cars shall remain under the control of the operator until returned to service.

211.3e Operating Procedures

Instructions for operation of elevators under Phase I shall be incorporated with or adjacent to the Phase I key-operated switch (Rule 211.3a-1-a) at the designated level. Instructions for operation of elevators under Phase II shall be incorporated with or adjacent to the switch, in or adjacent to the operating panel in each car, required by Rule 211.3a-2. Instructions shall be in letters not less than 1/8 inches (3.2mm) in height and shall be permanently installed and protected against removal and defacement.

Appendix VI

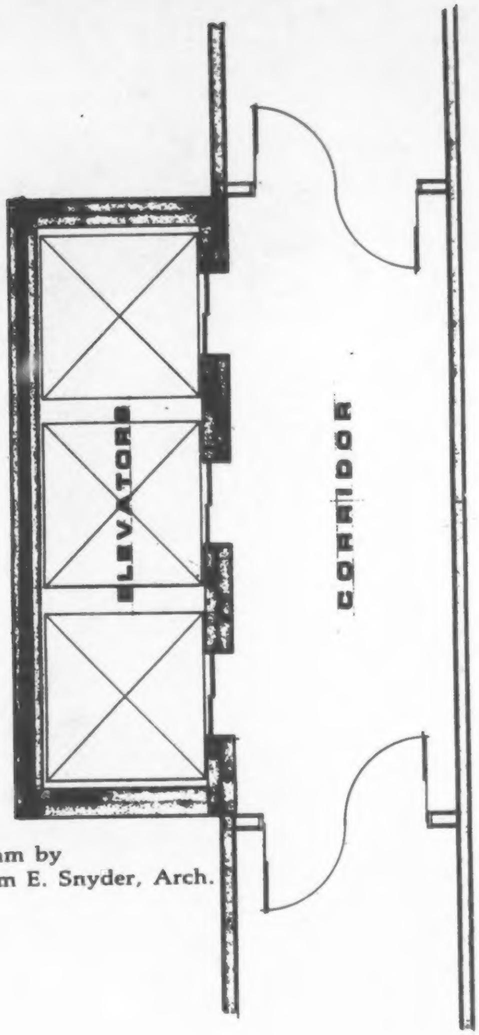
ELEVATORS
CORRIDOR

Diagram by
William E. Snyder, Arch.

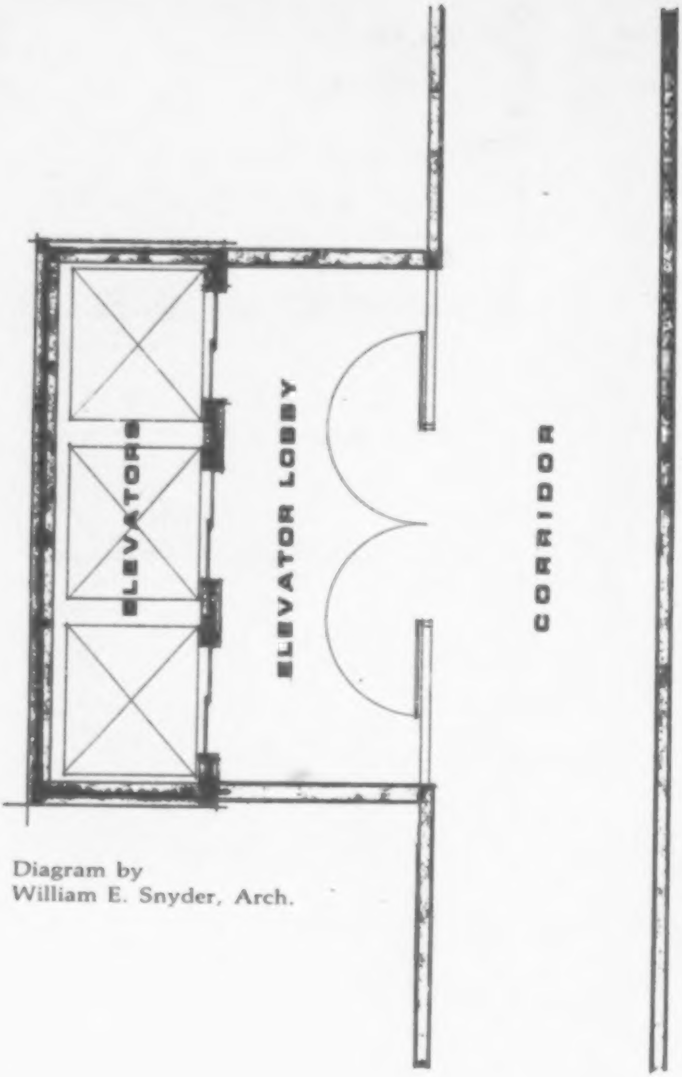
ELEVATORS
ELEVATOR LOBBY
CORRIDOR

Diagram by
William E. Snyder, Arch.

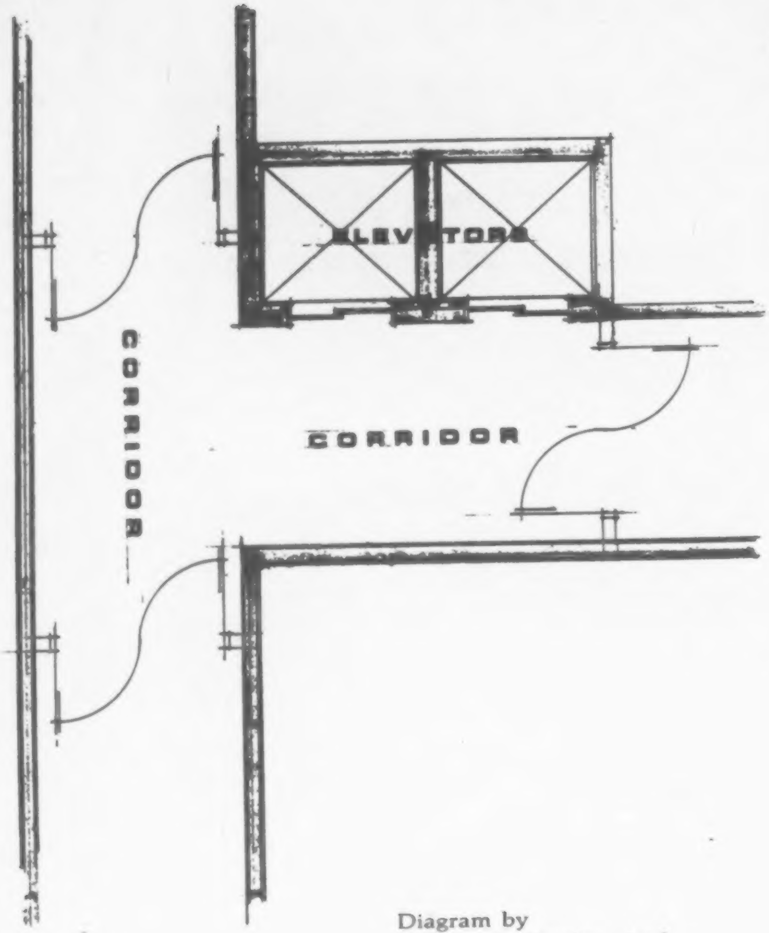
ELEVATORS
CORRIDOR
CORRIDOR

Diagram by
William E. Snyder, Arch.

Appendix VII

Section 104. (b) Additions, Alterations and Repairs: More than 50 percent. When additions, alterations, or repairs within any 12-month period exceed 50 percent of the value of the existing building or structure, such building or structure shall be made to conform to the requirements for new buildings or structures.

Section 104. (c) Additions, Alterations and Repairs: 25 to 50 percent. Additions, alterations, and repairs exceeding 25 percent but not exceeding 50 percent of the value of an existing building or structure and complying with the requirements for new buildings or structures may be made to such building or structure within any 12-month period without making entire building or structure comply. The new construction shall conform to the requirements of this Code for new building of like area, height, and occupancy. Such building or structure, including new additions, shall not exceed the areas and heights specified in this Code.

Section 104. (d) Additions, Alterations and Repairs: 25 percent or less. Structural additions, alterations, and repairs to any portion of an existing building or structure, within any 12-month period, not exceeding 25 percent of the value of the building or structure shall comply with all of the requirements for new buildings or structures, except that minor structural additions, alterations, or repairs, when approved by the Building Official, may be made with the same material of which the building or structure is constructed. Such building or structure, including new additions, shall not exceed the areas and heights specified in this Code.

Appendix VIII

FIRE HAZARD ANALYSIS SURVEY

EXISTING HIGHRISE BUILDINGS

The attached chart indicated those building deficiencies that appear to occur on a repetitive basis in serious highrise fires and which are causative factors in relation to extensive property and life loss in such fires.

Those fires referenced from NFPA Fire Journal reports include all highrise fires which were investigated by NFPA staff and reported thereon for the period 1969 through January 1975. Fires occurring outside of the United States are included because they illustrate many of the problems common to highrise building fires and the information gleaned from these fires should affect current fire protection thinking in this country.

The totals of each deficiency are listed in descending order of occurrence.

FIRE SAFETY BUILDING DEFICIENCIES

1.	Open vertical shafts and poke through	16
2.	Fire alarm deficiency	14
3.	Elevators	14
4.	Substandard corridor openings	12
5.	Improper action	12
6.	Flammable finish	10
7.	Inadequate egress	9
8.	No door closer	9
9.	Open stairs	8
10.	HVAC recirculation	6
11.	No emergency lighting	5

The column titled "Fire alarm deficiency" includes those instances where there was no fire alarm or where it was reported as being ineffective. It also includes those instances where lack of communication facilities to instruct occupants was a serious factor.

"No emergency lighting." Included those instances where this information was given.

HVAC (Heating, Ventilating and Air Conditioning). Includes all instances where air handling of fan systems contrubuted to fire, smoke or heat extension.

"Improper action." Includes instances where management or staff that should have had fire safety training acted or failed to act in a proper manner.

"Elevator." Includes instances where elevator equipment or controls failed, or where the elevator shaft formed a path of travel for fire, smoke or heat extension. In these cases vertical smoke migration was a significant factor when elevators were found at the fire floor with doors open.

Exterior vertical extension of fire was an important factor in six of the reported fires, three occurring in South America. This information was not included in the chart.

A short summary of each fire is included to provide informational background on the similarity of building deficiencies that are repeatedly described as causative factors in extensive life and property loss in highrise building fires. However, for full information on each fire, it is suggested that the references reports be perused.

CONTRIBUTORY CAUSES TO LIFE AND PROPERTY LOSS

			Open stairs	Open vertical shafts and poke thru	Inadequate egress	Fire alarm deficient	No emergency lighting	HVAC recirculation	Improper action	Sub-standard corridor opening	Flammable finish	Elevator	No door closer	Source
1. 9/23/64	San Francisco	7 story—Office					x			x		x	x	2
2. 2/7/67	Montgomery, Ala.	10 story—Restaurant and hotel			x						x			3
3. 1/24/69	Chicago	39 story—Apartments				x				x		x		1
4. 1/25/70	Chicago	25 story—Hotel				x			x	x		x	x	1
5. 4/12/70	San Francisco	6 story—Hotel		x			x			x			x	2
6. 5/15/70	San Francisco	11 story—Furniture mart		x						x	x		x	2
7. 8/5/70	New York	50 story—Office		x		x		x			x	x		1
8. 11/18/70	San Francisco	52 story—Office				x		x				x		2
9. 12/4/70	New York	47 story—Office		x		x						x		1
10. 12/20/70	Tucson	11 story—Hotel	x		x	x	x			x	x		x	1
11. 1/1/71	Los Angeles	25 story—Apartments										x	x	2
12. 1/4/71	San Francisco	6 story—Apartments	x	x		x	x			x				2
13. 2/10/71	San Francisco	22 story—Office						x						2
14. 3/28/71	Los Angeles	21 story—Restaurant and hotel		x										1
15. 7/6/71	Nashville	28 story—Office				x		x						1
16. 7/23/71	New Orleans	15 story—Hotel				x			x			x		1
17. 2/24/72	Sao Paulo	31 story—(Andraus)	x	x	x	x	x			x	x			1
18. 5/13/72	Osaka	7 story—Building	x	x	x	x			x					1
19. 11/15/72	Chicago	100 story—Office and 7 apartments							x					1
20. 11/29/72	New Orleans	16 story—Office			x					x	x	x	x	1
21. 11/30/72	Atlanta	11 story—Apartments		x					x	x	x	x	x	1
22. 12/15/72	Ventnor, N.J.	19 story—Apartments				x								1
23. 12/28/72	Dallas	16 story—Apartments		x										1
24. 1/8/73	Madison	10 story—Apartments							x			x	x	1
25. 4/2/73	Rosemont	10 story—Hotel		x	x	x			x			x		1
26. 6/25/73	Tucson	11 story—Office							x					1
27. 7/23/73	Bogota	36 story—Office		x	x					x	x			1
28. 11/5/73	Indianapolis	(Group fire)												
29. 11/10/73	Toronto	43 story—Office	x						x			x		1
30. 11/28/73	Kumato	9 story—Department store	x	x					x					1
31. 1/15/74	Rio, Brazil	31 story—(Vacant)	x	x	x						x			1
32. 2/1/74	Sao Paulo	25 story—(Joelma)	x	x	x	x			x		x			1
33. 9/8/74	Virginia Beach	11 story—Hotel							x	x				1
34. 11/12/74	Los Angeles	15 story—Office		x				x				x		1
35. 1/31/75	San Francisco	22 story—Office						x						2
TOTALS:			8	16	9	14	5	6	12	12	10	14	9	

SOURCE:
1—Fire Journal
2—Fire Department Report
3—N.F.P.A. Publication

1. San Francisco, California—September 23, 1964
717 Market Street—7 story office building—1 fatality

The Fire originated on the 6th floor and spread to the adjoining offices on the floor. Transoms and unrated corridor doors, without closers, were contributory to the fire spread.

Two firemen were trapped in the elevator on the fire floor when the heavy smoke prevented the electric eye from operating. One fireman survived, the second fireman died October 21, 1964.

S.F.F.D. Fire Report

2. Montgomery, Alabama—February 7, 1967
10 story penthouse restaurant—25 fatalities

The loss of 25 lives in this fire, the largest loss of life in a U.S. restaurant fire in almost 25 years, was blamed on three factors; inadequate exits, combustible interior finish, and lack of sprinklers

. . . From the general location of the bodies it was obvious that there would have been little or no loss of life had the second stairway been extended to the penthouse and clearly marked.

From: N.F.P.A. Publication No. FR 74-1, 1974 titled "A Study of Restaurant Fires."

3. Chicago, Illinois—January 24, 1969
39 story apartments—4 fatalities

The fire occurred in the 36th story. Conditions indicate the fire burned for some time.

The 10-inch wide spaces at one side of each apartment are covered by a panel of 1-inch particle board. . . .

The apartment building has no alarm system, automatic sprinklers or detection system.

There was no way for the products of combustion to vent themselves except through the door, through the elevator doors, or into the apartments.

Use of elevators by occupants of floors beneath the fire hindered elevator evacuation of the floors above. Firefighters were delayed in reaching the fire because of the heavy demand on the elevators.

The particle board adjacent to the doors burned through in some places, allowing fire to enter a few apartments.

Fire Journal—May, 1969

4. Chicago, Illinois—January 25, 1970
25 story hotel—2 fatalities

Each guest room has a standard 1¼-inch frame door with ¼-inch panel.

Before the fire about 50 chairs awaiting repair had been stored in the 9th floor elevator lobby (where the fire originated). Other elevators responded unoccupied to the 9th floor level, apparently because of fire damage to the call circuit. . . .

The two victims were attempting to reach the stairway. As they went they left the doors open.

One of the significant features of this fire was the lack of an alarm sounding system.

Fire Journal—May, 1970

5. San Francisco, California—April 12, 1970
6 story hotel

Fire originating in the main floor restaurant dining room rapidly spread through the ceiling space and raced upward through two unprotected plumbing shafts located by the center firewall. Hall doors were ¼-inch panel without closers.

S.F.F.D. Fire Report

6. **San Francisco, California—May 15, 1970**
11 story furniture mart building

The fire originated on the 11th floor and spread throughout the entire 11th floor and through the roof doing considerable damage.

The fire spread rapidly throughout the display spaces due in part to the absence of fire rated corridor walls and doors without closers.

S.F.F.D. Fire and Inspection Reports

7. New York City, New York—August 5, 1970
50 story office building (No. 1 N.Y. Plaza)—2 fatalities

The inside face of the curtain wall and the spaces between and above the windows are insulated with one-inch Dorvan FR 100 Polystyrene foam board. . . .

Except for the concrete and metal, almost everything in the building is combustible to some degree—foam plastic wall insulation, electrical cables, ceiling tiles, partitions and insulation on air handling units. . . .

Openings in the floors around air conditioning ducts, electrical fixtures, and the cables themselves, as well as the vertical shafts in the outer wall cut off only by a sheet of aluminum, allowed fire spread between floors.

Two dead men were found on the floor of the elevator at the 33rd floor.

Since the return air fans were not shut down smoke was drawn into the return air shafts through the openings on the 33rd floor. This smoke carried by positive pressure through the supply ducts and to some extent through the return air shafts to the various floors, was of sufficient intensity on most floors to require evacuation.

Fire Journal—January 1971

8. San Francisco, California—November 18, 1970
52 story office building

Smoke damage occurred throughout most of the 35th floor, with minor smoke damage as high as the 38th floor. The major structural components performed as designed.

Smoke penetrated into elevator shafts and was carried to higher floors. Building occupants using these elevators became frightened, and one case of serious hysterical behavior was noted.

The supervising chief on the fire floor was unable to communicate by department radio with the command post at the building front, street level occupants complained of lack of information and direction.

S.F.F.D. Fire Report

9. New York City, New York—December 4, 1970
919 3rd Avenue—47 story office building—3 fatalities

If this fire had occurred on one of the upper floors, where it could not have been attacked by hose streams through windows, lack of vertical protection might have contributed to fire spread to floors above. . . .

Means should be provided to notify all employees of an emergency and of the action to be taken by them. At 919 Third Avenue employees on upper floors complained chiefly of lack of notification of the fire.

Three people died in the fire, two in the hall and one in the elevator on the fire floor.

Occupants complained of lack of direction.

Fire Journal—March, 1971

10. Tucson, Arizona—December 20, 1970
Pioneer Hotel—11 stories—28 fatalities

Investigators feel that the fires were set sometime before midnight, and they spread rapidly joining and then spreading up the two open stairways.

Very few people became aware of the fire in time, as there was no alarm system.

The light panel doors held up fairly well and did not allow a significant amount of fire in the rooms. The rooms in which doors were left open were completely burned out. . . .

The carpet and wall covering did however, (contribute to the fire load), and to a degree sufficient to cause the fatalities and the severe damage.

There was a fire escape within several feet of where the bodies were found (two victims). The window to the fire escape had been covered—a light drape had been hung to cover this part of the wall.

Fire Journal—May 1971

11. Los Angeles, California—January 1, 1971
25 story apartment

A Christmas tree fire gutted a 4th floor apartment and spread out the open doorway filling the building from the 4th floor to the top story with heavy black smoke. Heat and smoke traveled from the fire through the halls into the elevator shaft destroying the equipment. The flames shot up the shafts sending columns of smoke down each corridor.

"In summing up the elevator incident I arrive at certain possibilities (all elevators were at the fire floor with doors open):

1. That tenants called the elevators to the fire floor, smoke obscured the photo electric beams and the doors remained open;

2. That the intense heat of the hall fire short circuited the 4th floor call buttons and the elevators came to the fire floor."

L.A.F.D. Fire Report

12. San Francisco, California—January 4, 1971
6 story apartment building

The fire originated on the stairs between the basement and first floor levels, spread up the stairs to the 6th floor at which point it mushroomed out through the panel door into the public hall and into several of the apartments on that floor.

The fire alarm did not sound, apparently due to damage during the fire.

S.F.F.D. Fire Report

13. San Francisco, California—February 10, 1971
22 story office building

An electrical fire in the air conditioning filter system spread smoke throughout the building, requiring evacuation of the entire structure.

S.F.F.D. Fire Report

14. Los Angeles, California—March 28, 1971
21 story office building—Roof restaurant

The fire in the restaurant on the top floor was confined to the restaurant area by a two-hour fire resistive wall with a Class B rated door that separated the restaurant from the remaining area.

Water flowing down through "poke-through" holes left unsealed around conduit, piping, and ducts caused water damage three floors below the fire.

Fire Journal—November, 1971

15. Nashville, Tennessee—July 6, 1971
28 story office building

The fire occurred on the first floor in the fan room of the air handling system.

Employees discovered the fire when dense smoke poured into the first floor lobby. The fans were shut down and the three smoke filled floors of the building were evacuated, but the manual fire evacuation system (alarm) failed to function.

Fire Journal—November, 1971

16. New Orleans, Louisiana—July 23, 1971
17 story hotel—6 fatalities

None of the victims were burned. Smoke inhalation was tentatively listed as the cause of all deaths.

Guests said they heard the fire alarm, but it sounded "more like somebody's alarm clock."

Five of the victims were trying to escape from the motor hotel by using the elevator from the 15th floor. When the elevator reached the 12th floor it stopped and the doors opened. Five of the six passengers died from the heat and smoke in the corridor.

The delay in reporting the fire was an obvious error on the part of the hotel management.

Had the guard not opened the door to the fire room, and had he instead operated the alarm, and started evacuating people, he and the five others who died would probably be alive today.

Fire Journal—January, 1972

17. Sao Paulo, Brazil—February 24, 1972
31 stories (andraus)—16 fatalities

Wind velocity and combustible interior finish were factors contributing to fire spread. . . .

Reducing the fuel contributed by combustible ceilings and wall partitions could have slowed fire spread, providing more time for evacuation to a safe area or for fire extinguishment. . . .

Fuel control, compartmentation, and provision of automatic detection or extinguishing systems are important considerations in a systems approach to fire safety design.

The door construction in the office stairway was mixed hollow-core wood, solid-core wood, and metal.

Fire Journal—July, 1972

18. Osaka, Japan—May 13, 1972
7 story building—118 fatalities

The principle causes of the many casualties were:

1. The four open stairways.

2. Failure to announce the fire and its location and to instruct the occupants over the loudspeakers.

3. The rapid rise of toxic smoke and hot gases from the 3rd floor through open stairways, elevators and shafts, . . .

Fire Journal, March, 1973.

19. Chicago, Illinois—November 15, 1972
100 story office and apartment building

Starting on the 96th story, the fire caused damage to the 95th and 97th stories also. . . . Firefighters found that the fire had entered the 97th story through windows.

This fire is an excellent example of the value of careful fire department planning, including coordination of emergency procedures with those of building maintenance and security personnel.

Fire Journal—March 1973

20. New Orleans, Louisiana—November 29, 1972
16 story office building—6 fatalities

It was the lightweight doors to the corridors and the delayed discovery that allowed the fire to do so much damage. . . .

There was little to burn in the corridor. The damage there and in the beauty salon appeared due to burning of fire gases from the room of origin, in addition to the burning of the interior finish in the beauty salon.

Combustible interior finish in the 16th story restaurant aided the fire spread.

Fire Journal—May 1973

21. Atlanta, Georgia—November 30, 1972
11 story apartment—10 fatalities

A combination of factors contributed to the fire exposure: Delayed alarm; the open door to the apartment of origin, use of corridor to supply make up air, use of corridor carpeting with fire hazard characteristics beyond what is considered acceptable. . . .

Considerable smoke and heat were spread by the elevator shaft. The shaft was exposed by open elevator doors on the fire floor and on the tenth floor. . . .
Fire Journal—May, 1973

22. Ventnor, New Jersey—December 15, 1972
19 story apartment—1 fatality

One firefighter was killed and three others were injured in a 4th floor fire. The alarm system was found to be wholly inadequate, since many occupants could not hear the alarm.
Fire Journal—July, 1973.

23. Dallas, Texas—December 28, 1972
16 story reinforced concrete apartment

The fire started in a christmas tree in an 8th floor apartment. The fire was confined to the apartment of origin and to about 40 feet of corridor to the left and right of the apartment, but all floors above the fire floor received extensive damage from smoke that spread through the poke-throughs and ceiling spaces.
Fire Journal—May, 1973

24. Madison, Wisconsin—January 8, 1973
10 story apartment—3 fatalities.

The fire originated in a 4th floor apartment, whose door was left open after discovery of the fire, allowing heat and smoke to fill the corridor.

Occupants failed to actuate the manual alarm after discovery of fire; an employee investigated before calling the fire department. Heat and smoke had extended to upper floors through the elevator shaft, because one elevator had remained at the 4th floor with its door open. . . .
Fire Journal—September, 1973

25. Rosemont (Chicago), Illinois—April 2, 1973
10 story atrium (hotel)

The atrium structure rose from the 2nd to the 11th floor and was topped by an extensive skylight.

The fire started in the 2nd floor night club in the hotel. Firefighters found the atrium charged with smoke and the night club fully involved.

1. The mechanical smoke exhaust system did not operate, because the switch connecting the smoke detection system had been turned off.
2. Exit doors were painted the same color as the surrounding wall, obscuring their locations in the dense smoke.
3. The fire alarm system was not heard by all guests, necessitating the calling of guest rooms by telephone.
4. Guests attempted to use automatic elevators for escape. Since the elevators could not be manually controlled, firefighters had to ride the cars to prevent their use.

Fire Journal—November, 1973

26. Tucson, Arizona—June 25, 1973
6 and 11 story twin towers, office building

The fire occurred in the 4th floor which was used for storage of 1400 plastic voting machines, miscellaneous office furniture, etc.

On arrival the first fire companies found flames extending from windows on the 4th floor and entering windows on the 5th and 6th floors.

At least one employee on the 11th floor did not hear the alarm, but an intercom system was also used to announce the fire, its location, and the two escape routes. A supervisor attempted to extinguish the fire before calling the fire department.
Fire Journal—January, 1974

27. Bogota, Colombia—July 23, 1973
36 story office building—4 fatalities

A single stairway ran from the basement to the roof. Stairway doors at each floor were hollow-core wood. . . .

Spaces between the outer metal skin and the outer walls of the occupied area created a pathway for fire to spread from floor to floor.

Much of the interior wall surface was combustible.

The fire department did not receive a report of the fire until 35 minutes after the fire had been discovered.

Fire Journal—July, 1974

28. Indianapolis, Indiana—November 5, 1973
Group fire

This group fire involved 7 buildings including one 17-story apartment, a 13-story and a 7-story office building and a 7-story garage. Exterior exposures consituted the principal problem and the fire reports have insufficient detailed information to be of any value in the hazard analysis survey.

Fire Journal—July, 1974

29. Toronto, Canada—November 10, 1973
43 story office building

The building had enclosed stairwells, but the accounting office had an open stairwell between the 27th and 28th floors.

The fire occurred in the mail room on the 27th floor and activated a smoke detector on the 28th floor at the top of the open stairwell, which registered on the ground floor console. Firefighters took the elevator to the 27th floor, assuming it to be the floor below the fire but when the elevator door opened, firefighters were confronted with intense heat, and the smoke prevented the door from closing. The firefighters were equipped with self-contained breathing equipment and were able to by-pass the electric eye switch and descend to the 26th floor, from where they used the staircase to attack the fire.

Fire Journal—March, 1974

30. Kumato, Japan—November 28, 1973
9 story department store—103 fatalities

The fire originated in combustible materials stored in a stairway, and spread rapidly to all floors above by way of stairways and escalator floor openings. . . .

No one can remember a fire alarm being given nor was any warning or guidance broadcast over the loudspeakers to direct the occupants to safety. . . .

Most of the 1400 occupants escaped to the ground through interior stairways.

Fire Journal—May 1974

31. Rio de Janeiro, Brazil—January 15, 1974
31 stories—(Unoccupied)

Factors influencing fire spread were combustible ceilings, open stairwells, combustible wall covering in stairways, partial sprinkler protection, that was overcome by an already well developed fire. This fire points to one important reason why open stairways should not be permitted.

Fire Journal—July, 1974

32. Sao Paulo, Brazil—February 1, 1974
25 stories—179 fatalities

While the basic building construction was fire resistive, the interior finish consisted entirely of combustible materials, which contributed to the rapid spread of the fire throughout the building. Only one stairway was provided, and it was not enclosed. There was no local evacuation alarm, no exit signs and no emergency procedure to guide occupants.

In my opinion the severity of the fire and its rapid spread can be attributed to the following:

1. Unprotected interior vertical shafts.
2. Extreme usage of portable L.P. Gas cylinders.
3. Combustible interior partitioning and ceiling without restriction as to flame spread.
4. Inadequate protection of wall openings re. too much glass without proper fire barriers.
5. Improper electrical wiring.
6. Inadequate fire resistance of roof.

The building had no illuminated exit signs, or emergency illumination.

Fire Journal—July 1974 and Building Standards, May/June, 1974

33. Virginia Beach, Virginia—September 8, 1974
11 story hotel—1 fatality.

The fire was initially contained in the room of origin on the 9th floor. If the room door had been left closed and the fire department had been called promptly the damage would probably have been contained to that room.

All the room doors had been undercut 1 1/8-inch to 1 1/4-inch. There was evidence of fire spread from the hall to nearby carpet inside rooms by means of these openings.

Of significance in this fire was the *delayed alarm* and the failure of certain fire protection devices.

Fire Journal—January, 1975

34. Los Angeles, California—November 12, 1974
15 story office building

The fire occurred in the 8th floor where maintenance workers were using lacquer thinner to clean walls.

About 2,000 occupants evacuated safely, mostly down the two stairways which were equipped with fire doors and ventilating tower.

The air-conditioning system which was not designed to exhaust smoke and heat helped spread the smoke throughout the building. Smoke was also transmitted to other floors by the elevators; also through breeches made through floors and walls by contractors for various conduits.

Fire Journal—November 1975

35. San Francisco, California—January 31, 1975
22 story office building—S.F. International Building

The fire started in the cloth type aerosolve air filters in the air conditioning plenum on the second level. Smoke was recirculated throughout the building, requiring evacuation of all occupants. Property damage was slight.

S.F.F.D. Fire Report

Appendix IX

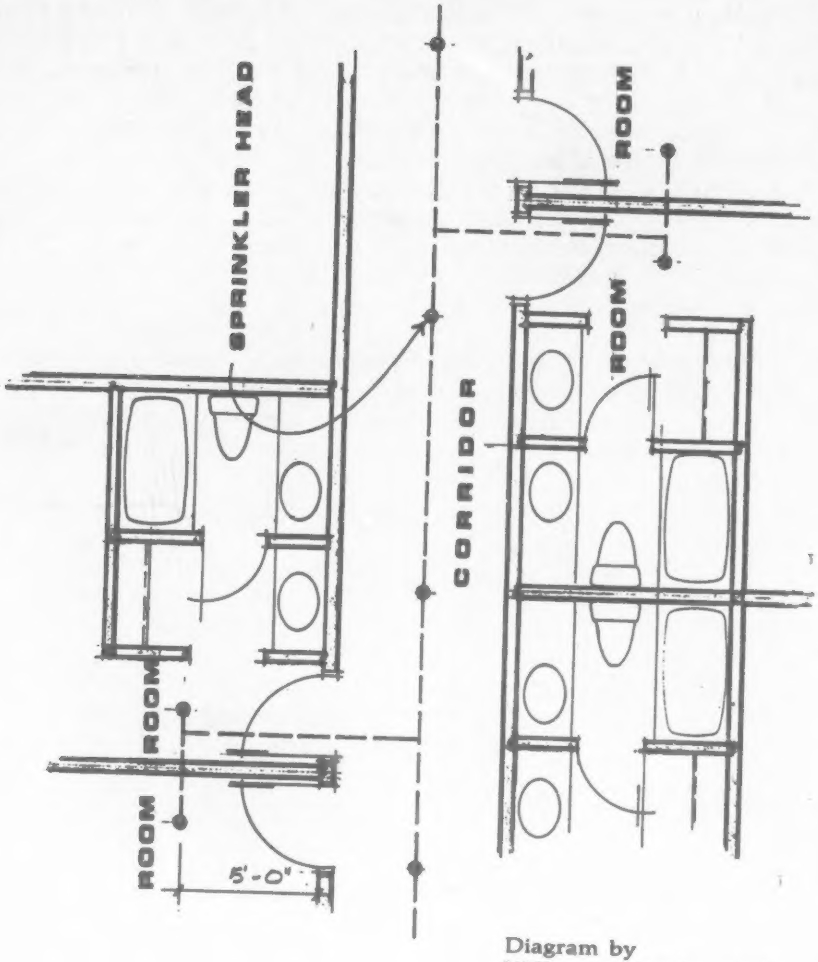
SPRINKLER HEAD
ROOM
ROOM
CORRIDOR
ROOM
ROOM
5'-0"

Diagram by
William E. Snyder, Arch.

Mr. **Jordan**. They studied fires around the world. They found the same thing that we're all finding, that despite fire-resistive construction, toxicity is what is killing the people from the furniture, and fixtures, and inferior flame spreads.

In February of '81, we had another arson fire in a hotel that killed another eight people, and the same findings. Senator Neal of the State of Nevada introduced Senate bill 214, and I might add, Senate bill 214 was not aimed at just the lodging industry, it was aimed at all buildings that are open to the public—office buildings, places of public assembly, as well as places of lodging—and here again, I sit here this afternoon and listen to a lot of rhetoric.

It reminds me about the "haz mats." Everybody has a thing about "haz mats;" nobody understands what it is. Someone thinks of gasoline; another one will think of some exotic material. We talk about hotels and motels, and we're talking about apples and oranges when we're talking about height, and area, and width, and type of construction.

The Governor's Commission report—now, between 1981 and 1985, the State fire marshal and local fire marshals conducted 33,000 building inspections. We spent an estimated $550 million in fire retrofit in the State of Nevada. We have 20 buildings that still remain closed, and they'll either be sold and brought up to code or they'll be demolished. Not one appeal or court challenge was filed against this law.

We had a method of review and control on the part of this law. We had a board of fire safety. We had a provision for the issuance of industrial bonds to help people apply if they had a financial hardship. We had a financial hardship and a time extension criteria that some people utilized, but there were no applications made for the money. The industries and the businesses came up—

Mr. **Boehlert**. I just want to make sure. No applications made for money.

Mr. **Jordan**. Not a one.

Mr. **Boehlert**. Thank you.

Mr. **Jordan**. There were some time extensions for financial hardship granted by the Board of Fire Safety, but that was then—they financed under private sources.

Nevada business owners, of course, take the credit for this and a lot of out-of-State owners of chain properties. They met the spirit of the law and also, of course, the intent.

I believe H.R. 94 is a good law. I do recommend, however, in keeping with the 1988 Uniform Building Code and 1988 Uniform Fire Code, which is used in 28 States in this country, and in keeping with our own definition, that the provision of 20 or more guest rooms be added to the requirement for systems, for fire sprinkler systems. That way, you're not only into height, but you're into a limitation on area, which gives you the fire load in your community. So you don't want a massive, two-storey motel built just to avoid sprinklers—20 or more rooms, and that's already half of the country. Anything that is built now has to meet that standard.

And, with that, I would again thank the committee. I believe that you're on the right track. There's a lot of technicalities that need to be resolved, some of which you've addressed this afternoon, and some of the people you've heard from are administrators, and they don't know the difference between a pipe schedule sprinkler system and a hydraulically calculated sprinkler system.

Mr. **Boehlert**. Neither do I.

Mr. **Jordan**. So you've got to be careful about definitions.

Your bill is open. It does need some tune-up, but it's a good bill, and I'm certainly for it as a fire marshal, and Nevada, I think, has already set a precedent that it can be done.

[The prepared statement and biographical sketch of Mr. Jordan follow:]

BOB MILLER
Acting Governor

STATE OF NEVADA
DEPARTMENT OF COMMERCE
STATE FIRE MARSHAL DIVISION
Capitol Complex
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LARRY D. STRUVE, *Director*
Department of Commerce

REX JORDAN, *Fire Marshal*
State Fire Marshal Division
(702) 885-4290

March 3, 1989

U.S. House of Representatives
Committee on Science, Space, and Technology
Suite 2321 Rayburn House Office Building
Washington, D.C. 20515

Chairman Roe and distinguished members of the committee:

On November 21, 1980, an accidental fire broke out in the 26-story MGM Grand Hotel in Las Vegas. The fire resulted in the deaths of 85 persons and injured another 679. At the time of the fire, there were an estimated 5,000 persons present in the hotel.

On November 24, 1980, just three days after this disastrous fire, Governor List established the Governor's Commission of Fire Safety codes and charged it with a thorough review of all conditions and regulations pertaining to fire safety codes in the State of Nevada regulating the construction of highrise buildings and public assembly occupancies to determine the adequacy and effectiveness in protecting the public. It was mandated that this review should extend to evaluation of codes and regulations governing the same classifications of occupancies which had been constructed prior to adoption of the current State Fire

Marshal's Regulations, and other adopted codes of the state. Comprising the Commission was a panel of experts in the field of fire protection, building construction and design, elected officials and members of the public.

The Commission was also given the task of evaluating methods of improving the life safety features of existing highrise and public assembly occupancies within the state. In order to accomplish this task the Commission reviewed 35-major fires in highrise building which had occurred around the world between 1964 and 1975. Common deficiencies were highlighted in the fires surveyed, which had occurred in buildings ranging form a 6-story hotel to a 52-story office building. The survey revealed fires were occurring in these highrise structures despite fire-resistive construction. In most cases, the facilities had non-existent or only partial automatic fire sprinkler systems such as that in place at the time of the MGM Grand Hotel fire.

I would like to point out that during the Commission's activities, yet another highrise hotel fire occurred at the Las Vegas Hilton on February 10, 1981. This arson fire resulted in the deaths of eight persons. Again, the hotel had been constructed using modern fire-resistive materials as specified in the adopted model building codes, but had no automatic fire sprinkler system. It became apparent that fire-resistive construction cannot stand alone against the ravages of fire, and that partial automatic fire sprinkler systems are not adequate to handle fires occurring in highrise structures, especially with the kind of fuel load that was present in the restaurant and casino areas of the MGM Grand Hotel.

The 1981 Nevada Legislature, after considering the facts and recommendations presented by the Governor's commission of Fire Safety Codes, enacted Senate Bill 214 introduced by Senator Joe Neal. The bill, which required installation of certain fire safety devices, became known in Nevada as the "fire retrofit law."

The bill outlined mandatory requirements with retroactive application which specified, among other requirements, that owners or operators of hotels and motels where human occupancy on floors which are more than 55 feet above the lowest level of ground accessible to vehicles of a fire department shall equip each exit corridor of the building with fire sprinklers as required by regulations of the state fire marshal, and, equip each room with at least one fire sprinkler above each door opening into an exit corridor of the building. Installation of smoke detectors was also mandated for hotels and motels in rooms used primarily for sleeping in those facilities with six guest rooms or more.

The bill provided for the survey of buildings within the state to take place within six months, and owners of those buildings to submit plans of correction implementing the requirements of the fire retrofit law within six months after completion of the survey. The bill detailed responsibility for those counties in Nevada with a population of less than 100,000 to the State Fire Marshal, and all other counties as the responsibility of the local fire chief and chief building official.

Practicality of application of the stringent requirements mandated that a forum be developed to provide for the granting of time extensions and variances that would allow for use of alternative methods that met with the intent of the law. In addition to creation of the State Board of Fire Safety to deal with those issues, the Legislature also made provisions for the issuance of industrial bonds to assist businessmen in meeting the new requirements. However, the Nevada State Commerce Department reported receiving no application for this funding assistance during the fire retrofit program.

During the survey period, approximately 33,000 building were inspected. An estimated $550 million in fire retrofit work was completed between 1981 and 1985. Only 20 buildings were closed that have not since reopened, and no appeal or court challenge was filed as a result of the "fire retrofit law."

The Nevada fire retrofit law is working. Nevada has not suffered a life loss from fire in a hotel or motel that is sprinklered and equipped with smoke detectors since 1985, according to the results of a recent poll of those fire departments in the state in which highrise hotel and motel facilities exist. We did experience the deaths of four persons in an unsprinklered motel due to an act of arson, which serves to point out the need for automatic fire sprinkler systems. This motel was being remodeled to meet retrofit standards when the fire was set.

Numerous incidents and statistics could be cited to point out the fact that automatic fire sprinkler systems save lives. A published report of the National Fire Protection Association noted that in a single four-story wood-frame hotel containing 67 rooms, each equipped with a smoke detector, lives were saved by the automatic fire sprinkler system. At 3:45 a.m., the hotel's audible fire alarm sounded alerting guests and hotel staff. Arriving firefighters found that a single sprinkler had extinguished the blaze after first confining it to a bed in a second-floor guest room. The bed's occupant was removed from the room unconscious and taken to a nearby hospital, where he was held for treatment of severe smoke inhalation.

Fire officials blame the $3,700 fire on the heavily intoxicated victim, who had apparently fallen asleep on the bed with a lighted cigarette in his hand, and the cigarette ignited the bedding material.

About 20 other overnight guests were evacuated for a short time. All were saved because of the presence of these life-saving fire protection devices.

H.R. 94 is a good law, and passage will take a giant step towards the reduction of loss of life by fire in highrise hotel and motel facilities across the nation.

It is recommended, however, that the law be amended before passage to add to Section 328(b)(2), a new section, "(D)," to read, "having 20 or more guest rooms."

Nevada's experience stands as an example of how the loss of lives by fire in our nation can be reduced by positive government action in concert with the business community.

BOB MILLER
Acting Governor

STATE OF NEVADA
DEPARTMENT OF COMMERCE
STATE FIRE MARSHAL DIVISION
Capitol Complex
Carson City, Nevada 89710

LARRY D. STRUVE, *Director*
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REX JORDAN, *Fire Marshal*
State Fire Marshal Division
(702) 885-4290

March 2, 1989

OPENING REMARKS

Committee of Science, Space & Technology

U.S. House of Representatives

Mr. Chairman, members of the Committee, for the record, I am Rex Jordan, Fire Marshal for the State of Nevada. I am here today to provide you with some facts pertaining to Nevada's "Fire Retrofit Law," and to provide answers to questions you may have. As one of the senior fire marshals in this country, let me congratulate the Congress, this Committee, and Congressmen Boehlert, Walgren and Walker for introducing H.R. 94, the Hotel and Motel Fire Safety Act of 1989. To often we see "legislation by catastrophe," in trying to protect people from fire, other than using our resources to mitigate serious potential fire and life safety potentials.

Nevada's "Fire Retrofit Law" is working. We have not had a life loss from fire in a hotel or motel that is sprinklered and equipped with smoke detectors since 1985. We did experience the deaths of four persons in an unsprinklered motel due to an act of arson, which serves to point out the need for automatic systems. This motel was being remodeled to meet retrofit standards when the fire was set.

After the terrible MGM Grand Hotel fire, on November 21, 1980, which killed 85 persons and injured 679, Nevada formed a commission to study fire and building codes dealing with all buildings open to the public.

An in-depth study was made of 35 major fires in highrise buildings around the world that occurred between 1964-1975. The findings were the same. Despite fire resistive construction, those buildings without automatic fire sprinklers and smoke detectors posed the greatest threat to the occupants. Toxic smoke was produced from the burning of furniture, fixtures and flammable interior finishes.

On February 10, 1981, an arson fire in a Nevada highrise hotel killed another eight persons. Again, the findings were the same. There were no full automatic systems in place.

Senator Neal introduced Senate Bill 214 in the 1981 session of the Nevada Legislature. The governor's commission report was presented and the Nevada "fire retrofit law" was enacted.

Between 1981 and 1985, the state fire marshal and local fire marshals conducted 33,000 building inspections. An estimated $550 million in fire retrofit work was completed.

Only 20 buildings still remain closed and will either be sold or demolished.

Not one appeal or court challenge was filed against this law.

A method of review and control was a part of this law through a Board of Fire Safety. A provision was also made for the issuance of industrial bonds to assist businesses that needed funds to comply. No applications were submitted. Nevada business owners should be credited for their cooperative attitude in meeting both the spirit and intent of this fire and life safety law.

I believe H.R. 94 to be a good law. I do recommend the law be amended to add to Sec. 328 (b) (2), a new section (D) to read, "having 20 or more guest rooms."

Your staff has been provided a copy of our commission report, Senate Bill 214 and our current law, NRS 477.

I recommend passage of H.R. 94 and thank you for allowing my testimony. Thank you.

BOB MILLER
Acting Governor

STATE OF NEVADA
DEPARTMENT OF COMMERCE
STATE FIRE MARSHAL DIVISION
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-BIOGRAPHY-

Rex Jordan

Rex Jordan, 63, currently serves as the fire marshal for the State of Nevada.

He has served as both a career and volunteer firefighter in all ranks, with service as fire chief for many years.

Mr. Jordan is a past member of the Board of the Fire Marshal's Association of North America, and served three years as a committee member for the Center for Fire Research.

Prior to joining the staff of the National Fire Protection Association (NFPA) where he served for four years primarily as executive editor of Fire Command Magazine, Jordan held the position of Chief Fire Marshal for the State of Washington for more than 7 years.

Mr. Jordan, who has published numerous articles and lectured on fire and life safety subjects, served as Assistant to the Fire Marshal prior to his appointment as Nevada State Fire Marshal.

Mr. **Boehlert**. Thank you very much, Mr. Jordan.

Mr. Henry.

Mr. **Henry**. Thank you very much, Mr. Chairman.

My name is Chet Henry. I'm the Fire Commissioner of the Commonwealth of Pennsylvania. I'm a career fire fighter and administrator of 42-plus years, retired from the city of Harrisburg as fire chief in 1976 and accepted the position that I now hold, and since that time I've had the distinct honor of appearing before this committee on four separate occasions, and today I'm really pleased to have the honor to come out publicly and offer strong support to H.R. 94, the Hotel/Motel Fire Safety Act of 1989.

The last time I was here, I was accused of being an actor, so in lieu of trying to keep from being accused of being an actor today, I don't want to be redundant and say many of the things that's already been said. I, too, am very much involved in the recommendations of America Burning, an outstanding report, and I think the National Commission certainly did an outstanding job.

But I had some references from America Burning, but I'd like to share with you a rendition of the fire problem, in lieu of being redundant, that I'm sure you'll enjoy. Perhaps you've heard it before. It goes something like this:

"I am more powerful than the combined armies of the world. I have destroyed more men, women, and children than all the wars of all nations. I massacre thousands of people every year. I am more deadly than bullets, and I have wrecked more homes than the mightiest guns. In the United States alone, I steal over $500 million each year. I spare no one. I find my victims among the rich and the poor alike, the young and the old, and the strong and the weak, and widows know me, to their everlasting sorrow, and I loom up in such proportions that I cast my shadows over every field of labor. I lurk in unseen places and do most of my work silently. You are warned against me, but you heed me not. I am relentless, merciless, and cruel. I am everywhere. I'm in the homes, and factories, and schools, on the land, in the air, and on the sea. I bring sickness, degradation, and death, yet few seek me out to destroy me. I crush, I maim, I devastate. I will give you nothing, and I will rob you of all that you have. You see, I am your worst enemy; I am rampant fire." And I think pretty much that says it all. That sums many of the recommendations up in America Burning.

As you eloquently pointed out, in America Burning, we do have the worst fire loss record of any other industrialized nation, and we have heard it said many, many times that common sense is applying the best wisdom we know today based on all of our yesterdays, and yet again we heard about the Andraus fire, the Joelma fire, the MGM fire, the Bethlehem fire—the Bethlehem hotel—and many others, and it's very obvious when you look at the fire loss records and the data in this country of ours, that we don't use that logic to its full potential, and I'm sick and tired of hearing everybody put the almighty dollar ahead of protecting the greatest resource of all; that's human resources.

I've heard it mentioned by some of our other speakers about the tragedy that occurred in Bethlehem. Well, I visited that site and conducted a thorough investigation the day after the fire, and, believe me, those five people should have never died.

We heard so much about America Burning, and in that report it said that one of our major problems is indifference and apathy, and that exists here today, and it's very obvious, as you listen to some of the testimony, that it still exists with some of the experts within this country of ours. Apathy and indifference.

If a fire were to occur in this room right now, with all the experts, as I look around this room, I wonder how each and every one of us would act. Nobody can predict what actions one will take when they're involved or confronted with a hostile environment, but one thing for sure, your actions or my actions many times is going to determine the difference between success or failure of many of the occupants of building of getting out safely or not getting out at all; and, let me tell you, that was the scenario in the Hotel Bethlehem fire in Bethlehem, Pennsylvania, on January 28.

A fire did occur on the fifth floor, in room 510. A young lady decided she was going to press a skirt, and I'm not going to get into the source of ignition, but they claim that[1] was the source of ignition. I won't get into all the circumstances surrounding it. But she discovered the fire somewhere around 7 a.m., in the morning, and she panicked, and when a person panics, as we all know, you lose all sense of time. She tried to put the fire out herself by using a towel that she got from the bathroom. She was unsuccessful. She then notified the front desk. The response that she got back was, "Yes, we know there is a fire in your room. Your smoke detector is in alarm state. We're going to send two employees up to check," after the fire was already—the detector already went into alarm state.

Two maintenance men arrived on the fifth floor, pulled a stand pipe hose, and tried to extinguish the fire. The fire got beyond their control, and then they notified the front desk again, and it was only at that time that they reached up and pulled the master box that notified the fire department.

So it was the actions in some cases and the inaction in other cases that caused five people to die; and yet, when you enter that hotel, it is a hotel that's constructed of fire-resistant material, concrete throughout; smoke detectors throughout the corridors; smoke detectors in all the stairwells; smoke detectors in every room. However, the problem was, it had a presignaling system. Again, apathy and ignorance as far as when you're dealing with fire safety.

Everybody thought, themselves, that they could handle the fire situation, and, as a result, the inactions from not notifying the fire department immediately caused a considerable delay factor, which caused five people to die right on that individual fire floor.

So I say here today one of the top recommendations of America Burning was that we should adjust attitudes and change behaviors. I don't think we can afford to continue to play a form of Russian roulette by hoping that we're going to change behaviors when confronted with a hostile environment. I think the only answer is to move in the direction that you people are having the foresight to take and put in life supporting systems to the built environment.

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[1] a travel iron.

So we in Pennsylvania totally support your efforts in making this great country of ours a better and safer place in which to live.

Thank you.

[The prepared statement of Mr. Henry follows:]

STATEMENT PRESENTED
TO THE
SUBCOMMITTEE ON
SCIENCE, RESEARCH AND TECHNOLOGY
U. S. HOUSE OF REPRESENTATIVES

"THE HOTEL AND MOTEL FIRE SAFETY ACT"
(H.R. 94)

MARCH 2, 1989
WASHINGTON, D.C.

BY
CHARLES A. HENRY
STATE FIRE COMMISSIONER
COMMONWEALTH OF PENNSYLVANIA

MY NAME IS CHARLES A. HENRY. I AM THE STATE FIRE COMMISSIONER FOR THE COMMONWEALTH OF PENNSYLVANIA, AND THE DIRECTOR OF THE OFFICE OF FIRE SAFETY SERVICES WITHIN THE PENNSYLVANIA EMERGENCY MANAGMENT AGENCY. I HAVE SERVED AS THE COMMONWEALTH'S FIRST FIRE COMMISSIONER SINCE DECEMBER OF 1976 AND, THROUGH THE COURTESY OF CONGRESSMAN WALGREN, HAVE APPEARED BEFORE THIS COMMITTEE ON OTHER ISSUES IN 1983, 1985 AND 1986.

FIRST, ALLOW ME TO EXPRESS MY APPRECIATION TO THE COMMITTEE FOR ALLOWING ME TO GO ON RECORD PUBLICLY IN SUPPORT OF HR 94, "THE HOTEL AND MOTEL FIRE SAFETY ACT". I HAVE HEARD IT SAID THAT, "COMMON SENSE IS APPLYING THE BEST WISDOM WE KNOW TODAY BASED ON ALL OF OUR YESTERDAYS". HOWEVER, WHEN WE LOOK CLOSELY AT OUR NATION'S FIRE PROBLEM, WE REALIZE VERY QUICKLY THAT THIS LOGIC IS NOT BEING USED WHEN IT COMES TO PROTECTING OUR COUNTRY'S RESOURCES. AS A CAREER FIREFIGHTER AND FIRE ADMINISTRATOR OF 42 YEARS, I CAN'T THINK OF ANY PROTECTION SYSTEM AVAILABLE TODAY -- OTHER THAN NOT HAVING A FIRE -- THAT IS AS EFFECTIVE AS A SPRINKLER SYSTEM IN SAVING LIFE AND PROPERTY.

DATA SHOWS US THAT SIXTY PERCENT OF ALL FIRES THAT OCCUR IN BUILDINGS PROTECTED BY A FUNCTIONAL SPRINKLER SYSTEM ARE EXTINGUISHED WITHOUT ANY OUTSIDE ASSISTANCE. AN ADDITIONAL THIRTY-SIX PERCENT ARE HELD TO THE POINT OF THEIR ORIGIN UNTIL THE ARRIVAL OF A MAINTENANCE MAN OR THE FIRE DEPARTMENT TO COMPLETE FINAL EXTINGUISHMENT. BASED ON THOSE FIGURES, WE CAN ACHIEVE A 96% EFFECTIVE RATE -- ALMOST PERFECTION.

IN SEPTEMBER, 1972, A REPORT WAS RELEASED ENTITLED, "AMERICA BURNING", WHICH STATED THAT EVEN THOUGH AMERICA IS THE LEADER IN SCIENCE AND TECHNOLOGY, WE LOSE MORE PEOPLE AND RESOURCES FROM DESTRUCTIVE FIRE THAN ANY OTHER INDUSTRIALIZED NATION. THE REPORT HIGHLIGHTED IGNORANCE AND INDIFFERENCE AS THE NUMBER ONE PROBLEM, AND MADE A STRONG RECOMMENDATION THAT IF WE WERE GOING TO BE SUCCESSFUL IN REDUCING OUR NATION'S FIRE PROBLEM, WE MUST MAKE FIRE SAFETY EDUCATION FOR THE AMERICAN PUBLIC A NUMBER ONE PRIORITY. WE WERE TOLD THAT WE MUST BECOME MORE PROACTIVE RATHER THAN REACTIVE, AND THAT THERE NEEDED TO BE MORE EMPHASIS ON FIRE PREVENTION.

THAT IS EQUALLY TRUE TODAY. FIRE DEPARTMENTS -- MANY OF WHICH CONFINE THEIR ROLES ONLY TO PUTTING OUT FIRES AND RESCUING VICTIMS -- NEED TO DEVOTE MORE TIME AND EFFORT ON THE FOLLOWING AREAS:

- EDUCATING CHILDREN AND ADULTS ON FIRE SAFETY;
- PROVIDING RESIDENTIAL INSPECTIONS;
- ENFORCING FIRE PREVENTION CODES, AND
- INSISTING THAT FIRE SAFETY BE DESIGNED INTO BUILDINGS.

SUCH EFFORTS NEED TO BE CONTINUOUSLY EVALUATED SO THAT MUNICIPALITIES, COUNTIES, STATES AND THE NATION CAN LEARN WHAT KINDS OF MEASURES ARE MOST EFFECTIVE IN REDUCING THE NUMBER OF DESTRUCTIVE FIRES.

OVER THE LAST DECADE, MUCH HAS BEEN DONE TO COMPLY WITH THE RECOMMENDATIONS MADE IN THE REPORT, "AMERICA BURNING"; HOWEVER, BECAUSE SO MANY FIRES ARE CAUSED BY HUMAN CARELESSNESS AND BECAUSE SO MANY PEOPLE REACT COUNTERPRODUCTIVELY WHEN A HOSTILE FIRE OCCURS, WHICH AFFECTS THE SAFETY AND WELFARE OF OTHERS, IT IS MY OPINION THAT WE MUST DO EVERYTHING TECHNOLOGICALLY POSSIBLE TO COUNTERACT HUMAN ERROR.

LET ME BRIEFLY EXPLAIN MY MOST RECENT EXPERIENCE. FIVE PEOPLE DIED IN A HOTEL FIRE ON JANUARY 28, 1989 IN BETHLEHEM, PENNSYLVANIA, WHERE THE OUTCOME WOULD HAVE BEEN SO MUCH DIFFERENT HAD THERE BEEN A FUNCTIONAL SPRINKLER SYSTEM INVOLVED. HERE'S THE SCENARIO:

THE BUILDING WAS A NINE-STORY STRUCTURE BUILT IN 1922 OF FIRE RESISTIVE CONSTRUCTION. THE INTERIOR PARTITIONING OF THE BUILDING APPEARED TO BE 4" MASONRY UNITS; THE FLOORS WERE CONSTRUCTED OF REINFORCED CONCRETE, AND THE EXTERIOR OF THE BUILDING WAS MASONRY. THE HOTEL APPEARED TO BE EQUIPPED THROUGHOUT WITH EMERGENCY LIGHTING AND MANUAL FIRE ALARM STATIONS, AND THERE WERE SMOKE DETECTORS LOCATED IN ALL ROOMS OF THE BUILDING. THE FIRE ALARM SIGNAL WAS A PRE SIGNAL SYSTEM (AN ALARM DEVICE WHICH SENDS A SIGNAL TO THE DESK AND TO A CENTRAL MONITORING SYSTEM, AFTER WHICH THE DESK MUST ACTIVATE THE GENERAL BUILDING ALARM).

STAIR TOWERS AT THE WEST AND SOUTHEAST ENDS OF THE BUILDING PROVIDED EXITS. THERE WAS ALSO AN INTERCOMMUNICATING STAIR ON EACH FLOOR, LOCATED TO THE EAST OF THE ELEVATORS. THE BUILDINGS SEEMED WELL MAINTAINED AND, FROM THE REPORTS, IT APPEARED THAT ALL EMERGENCY SYSTEMS FUNCTIONED DURING THE FIRE.

THE FIRE STARTED IN ROOM 510. THE FEMALE GUEST IN THAT ROOM REPORTED THAT WHEN SHE PLUGGED IN A PORTABLE TRAVEL IRON A SPARK SHOT OUT OF THE SOCKET, WHEREUPON SHE PULLED THE CORD OUT OF THE SOCKET; WRAPPED THE CORD UP AROUND THE IRON, AND PUT THE IRON INTO ONE OF HER TRAVEL BAGS. SHE ALSO REPORTED THAT THE SPARK STARTED A FIRE IN A STUFFED CHAIR LOCATED APPROXIMATELY ONE FOOT AWAY FROM THE OUTLET.

THE FIRE MARSHAL CONFIRMED THAT THEY FOUND THE REMAINS OF THE IRON IN THE TRAVEL BAG NEXT TO THE BED IN ROOM 510; HOWEVER, THE PLUG WAS FOUND IN THE ELECTRICAL OUTLET BEHIND THE STUFFED CHAIR. ONE OF THE PRONGS OF THE PLUG, PLUS ONE INCH OF WIRE FROM THE PLUG, WAS FOUND IN ONE PORTION OF THE RECEPTACLE AND APPROXIMATELY TWO-THIRDS OF THE OTHER PRONG WAS LOCATED IN THE OPPOSITE RECEPTACLE. THE REMAINING ONE-THIRD OF THE PRONG AND A SECTION OF WIRE APPROXIMATELY ONE INCH LONG WERE NOT LOCATED.

THE RESIDENT OF ROOM 510 REPORTED THAT THE FIRE STARTED AT APPROXIMATELY 7:10 A.M. SHE ATTEMPTED TO PUT THE FIRE OUT BY COVERING IT WITH A TOWEL; HOWEVER, SHE WAS UNSUCCESSFUL. SHE WENT TO HER PHONE, CALLED THE DESK AND REPORTED THE FIRE. THE DESK TOLD HER THAT THEY ALREADY KNEW THAT THE FIRE HAD OCCURRED BECAUSE THE DETECTOR IN ROOM 510 HAD ACTIVATED. THE DESK SENT TWO EMPLOYES TO THE ROOM WHO ATTEMPTED TO FIGHT THE FIRE WITH A 1-1/2" HOSE LINE CONNECTED TO A STANDPIPE IN THE FIFTH FLOOR CORRIDOR. THEY WERE UNSUCCESSFUL IN CONTROLLING THE FIRE. AN ALARM WAS SENT TO THE BETHLEHEM FIRE DEPARTMENT, AND THE FIRST UNITS ARRIVED AT THE SITE AT APPROXIMATELY 7:19 A.M. BY THIS TIME, THE FIRE HAD BROKEN THROUGH THE EXTERIOR WINDOW ON THE NORTH FACE OF THE HOTEL AND THE STAFF WAS EVACUATING RESIDENTS FROM THE BUILDING. THERE WERE APPROXIMATLY 90 GUESTS IN THE 126-ROOM HOTEL AT THE TIME. TWENTY OF THOSE OCCUPANTS WERE RESIDENTS OF A HOUSING-FOR-THE-ELDERLY BUILDING THAT WAS BEING RENOVATED, AND MOST OF THEM WERE STAYING ON THE FIFTH FLOOR.

WHEN THE FIREFIGHTERS ARRIVED, THEY BEGAN AN IMMEDIATE SEARCH-AND-RESCUE OPERATION ON THE FIFTH FLOOR AND THROUGHOUT THE BUILDING. THEY ATTACKED AND CONTROLLED THE FIRE AND REPORTED EVERYTHING SECURE BY 12:00 NOON. FIRE DAMAGE EXTENDED TO TWO ROOMS AND THE CORRIDOR OF THE FIFTH FLOOR. THE ENTIRE FIFTH FLOOR CORRIDOR NETWORK AND SEVERAL OF THE ROOMS RECEIVED HEAVY CARBON DEPOSITS AND HEAT DAMAGE.

THE INVESTIGATION, OF COURSE, IS CONTINUING, BUT IT IS MY CONSIDERED OPINION -- BASED ON MY FOUR DECADES OF EXPERIENCE -- THAT EVEN THOUGH THE BUILDING WAS TOTALLY PROTECTED BY A DETECTION SYSTEM, THE FACT THAT THE SYSTEM WAS A PRE SIGNAL SYSTEM MAY HAVE HAD A NEGATIVE IMPACT ON THE LOSS OF LIFE IN THAT FIRE. IT IS QUITE POSSIBLE THAT ALL OF THE RESIDENTS OF THE FIFTH FLOOR COULD HAVE ESCAPED THE FIRE HAD THEY RECEIVED A NOTIFICATION AS SOON AS THE DETECTION DEVICE IN ROOM 510 SENSED THE FIRE. THE APPARENT DELAYS CAUSED BY THE WILLING BUT UNSUCCESSFUL ATTEMPTS ON THE PART OF GUEST AND STAFF TO FIGHT THE FIRE HAD A SIGNIFICANT IMPACT ON THE OVERALL OUTCOME OF THE INCIDENT.
FURTHER, I WOULD BE REMISS IN NOT STATING CLEARLY FOR THE RECORD THAT IF THE BUILDING HAD BEEN EQUIPPED WITH A QUICK-ACTING RESIDENTIAL SPRINKLER SYSTEM, THE FIRE WOULD HAVE NOT PROGRESSED BEYOND THE CHAIR WHERE IT STARTED; THE HOTEL'S PROPERTY LOSS WOULD NOT HAVE BEEN NEARLY SO SEVERE AND, MOST IMPORTANTLY, THE FIVE FIRE DEATHS WOULD NOT HAVE OCCURRED.

IN CONCLUSION, LET ME SAY ONCE MORE THAT I URGE PASSAGE OF THIS LEGISLATION. EFFORTS MUST NOT CEASE IN OUR NOBLE ATTEMPT TO MAKE AMERICA A FIRE-SAFE NATION.

THANK YOU FOR YOUR ATTENTION.

CAH:SSC/C

Mr. **Boehlert**. Thank you very much, Mr. Henry, for your forcefulness and for your eloquence. I can assure you that the chairman and I are not apathetic or indifferent. We are committed, and we share your commitment.

Mr. Botts.

Mr. **Botts**. Thank you, Mr. Chairman. My name is Richard Botts. I am the Manager of the Risk Control Services Department of Fred S. James and Company, in Harrisburg, Pennsylvania. James is a large insurance brokerage firm in this country, and I must add, I appreciate the invitation to be here. However, I realized I was in trouble when I saw the agenda and saw I was following Chet Henry on it. I've always said I'd never want to follow him in a presentation.

First of all, I was asked, in part, how sprinklers impact on insurance costs. It's one of the first questions we, as brokers, are asked when we recommend sprinkler systems to clients. Many times, it's a difficult answer to them. But one of the things I can tell you is, we always have to ask them how much can they afford to lose if they don't install the sprinkler system.

The question of sprinkler savings in insurance costs is one of a fairly complicated nature because of the nature of the insurance industry itself. The main key to recognize what the savings are is to recognize how insurance rates and insurance premiums are developed.

First of all, most people recognize that their insurance cost is a premium they pay for the insurance. That is made up of two particles: one, their rate; and, secondly, a unit of exposure. Mostly, the unit of exposure is the value of dollars of property insured in the property areas or liability limits in the casualty areas.

On the other hand, the rate question is made up of many factors. In property insurance, for example, construction; the protection of the property, both internal and external; the occupancy of the facility; and exposures to that facility make up its rate.

ISO Commercial Risk Services is one of the main functions or arms of the insurance industry that utilizes and develops the insurance rates that are used by many stock insurance companies and other carriers in the insurance field.

I've included in my testimony, and I won't go into it, the information that's necessary to go into a fire insurance rate makeup for ISO Commercial Risk Services. However, what I would like to say is that the rates that are developed by ISO Commercial Risk Services are advisory in nature. Mostly, additional adjustments are made in the form of credits for either retention of risk in the form of deductible or by good management practices by the clients. Loss prevention practices, spread of risk, so on, have a bearing on the final premium that insurance carriers do charge.

What I'd like to look at is two examples, if you will, of hotels in the State of Pennsylvania in which case sprinklers were a factor in the insurance premium cost. The first risk is a large two- and three-storey motel facility with a large commercial restaurant within the main hotel facility as well as a detached convention center. There's a total area in the structure of 144,500 square feet. It's made up of mixed construction, of which mostly, 71 percent, is wood-joisted masonry wall construction. The value of the property that is stated on its insurance statement of values for building is $8,340,000; its contents, $1,400,000.

Back in 1981, we approached that motel, recognizing that there was a trend towards sprinkler protection requirements and recommended sprinklers to be installed. At that time, the insurance markets and structure of the rates for this facility did not help us to sell that fact to the owners.

However, a little later, Pennsylvania passed revisions to the Pennsylvania Fire and Panic Act which did require retrofitting by May 19 of 1989 of either full smoke detection systems or, in lieu of smoke detection, sprinklers. That key, coupled with a change in the insurance marketplace that took place in the 1985 and '86 era, gave us the impetus to convince the owners—and, by the way, a change in ownership so that there was also a possible problem with capital funds and so forth being available—to sprinkler that facility in a retrofit mode.

The installation was begun on that facility in June of 1986 and cost approximately $326,000 to complete. That included over 1,000 feet of underground water main in order to get the water from the public supplies into the facility. The cost breakdown, exclusive of the underground water mains, was approximately $1,000 per room unit in this hotel.

Their current fire insurance rate on that property was promulgated by ISO Commercial Risk Services bearing an effective date of October 31, 1988. The adjusted net 80 percent coinsurance rate for the building came out at $0.459 on the building and $.0647 on the contents per $100 of insurance. This would have generated a premium of $47,000 on the fire insurance of that facility based on the values that were reported.

We have taken that rate, which is published in '88, and backed out of the sprinkler credits. If you back out the sprinkler credits, the insurance rates would be $2.30-plus on the building and $2.53 on its contents, or a premium of $220,584, a savings of $173,000 a year for an investment of $326,000.

I must say that what you must look at here, though, is the rate reductions that were offered as a result of dispersion of risk, in part, good management credits, deductibles, and so forth, actually netted out to the fire insurance costs an $80,000 a year premium savings. That's in the fire insurance area. There was approximately another $10,000 offered by the insurance carrier for other areas of insurance coverages, so that this hotel reduced their insurance costs about $90,000 a year as a result of that $326,000 investment.

Mr. WALGREN. Let me stop you there just to try to clarify the numbers. You said that the cost to insure without the sprinklers was $220,000.

Mr. BOTTS. That would be the pure ISO fire rate, sir.

Mr. WALGREN. Pure ISO fire rate. And then, with the sprinklers, that dropped to $47,000.

Mr. BOTTS. Yes, sir.

Mr. WALGREN. For a difference of $173,000.

Mr. BOTTS. Yes, sir.

Mr. WALGREN. Now, then, how does that difference tie to the $90,000 and the $80,000?

Mr. **Botts**. Through rate credits that were offered within the premium makeup of the risk. These credits were partly through a $5,000 deductible which was being carried and other credits to the risk for other factors that were able to be offered by the insurance carrier in their package development process.

Mr. **Walgren**. And so the ultimate pocketbook saving was ninety—

Mr. **Botts**. Ninety thousand dollars a year.

Mr. **Walgren**. So essentially what that ninety does is, it takes the $173,000 and reduces it by certain non-fire-related credits—

Mr. **Botts**. Yes, sir.

Mr. **Walgren**. —that may have been available to that unit, and so the actual fire-related credit was ninety—was $80,000.

Mr. **Botts**. Yes.

Mr. **Walgren**. Eighty thousand.

Mr. **Botts**. The property insurance itself was $80,000.

Mr. **Walgren**. Property insurance itself. Does that include the contents?

Mr. **Botts**. Yes.

Mr. **Walgren**. Okay. So we're really looking at an $80,000 figure as the—

Mr. **Botts**. That's the pure savings to this hotel for its fire insurance program.

Mr. **Walgren**. Thank you very much.

Mr. **Botts**. There was a second hotel that we became involved with which was a two-storey garden type motel property with an attached restaurant operation. This is a much smaller facility, 62,800 square feet, was to be constructed with 120 rooms of 100 percent wood frame construction—wood walls, wood floors, and wood roof. Property values here, in their current property statement of values, is $3,106,000 on the building and $826,000 on its contents.

We were involved with the owners of this facility early in its early planning stages and recommended sprinkler protection to them. In this case, we were already into the throes of the Pennsylvania Fire and Panic Act, and the owners here recognized the value of sprinklers in other areas, because there were other property owners involved here besides just some motel operations. So we had no trouble in convincing them to go with the sprinkler installation, which was incorporated in the original construction of the facility.

That installation involved a fire pump, because the public water supply pressures were too low to properly design the system, and the total cost to the hotel in this case was approximately $125,000. The savings or net costs for the sprinklers in the hotel, per room, was approximately $1,125 based on those numbers.

In this case, the annual premium with the sprinkler system, pure premium again, is $40,325. If the sprinkler credits are backed out of that rate, the premium becomes $138,000, or a savings of $97,000 in pure premium. Here again, credits were involved for deductibles and other factors in the risk and netted out to a savings in this case of approximately $44,000 for this hotel facility to be sprinklered.

Both cases, as you will note, are paybacks of approximately three to four years in rate of return on the pure insurance savings. However, maybe what was more important, and particularly in the larger facility, was the insurance standpoint from a market look.

The standard insurance markets in 1986 were not conducive to good or accepting risks that they felt were problems. The market that was being used indicated that they would not renew the coverage without automatic detection system or automatic sprinkler system.

Therefore, we would have had an underwriting problem in placing the risk or have looked at other markets that may have been less attractive to the insured. So insurance market conditions are another factor that has to be entered into the picture.

Another thing that—of course, we did not have this situation with the second hotel, because it was already planned to be sprinklered. However, we feel pretty safe to state that, had we been trying to present to the insurance industry a two-storey, frame, unprotected facility of $3 million, we would have had some problems.

The value of the automatic sprinkler protection to the insurance industry and to industry in general, as well as the general public, is borne out in the statistics of the NFPA. The dollar loss per reported fire is far less in sprinklered properties than for nonsprinklered properties. The fact that there has never been a multiple-death fire in a property with a properly installed and functioning sprinkler system cannot be overlooked.

Over 97 percent of the fires in sprinklered properties are extinguished or controlled by the sprinklers, in most cases, by ten or fewer heads. In light hazard risks, such as hotels and motels, usually that's three or fewer heads.

Experience is another factor to look at. It is interesting to note that in the first hotel situation—and I gave you the rate situation involved—approximately six months after the sprinklers were placed into service, that hotel experienced a fire loss. The fire is believed to have been arson caused and was set in a third-floor meeting room near a window.

Due to the location and nature of that fire, it is believed that the fire would have easily extended into a blind, combustible attic space and, in that process, probably destroyed the entire facility. The area was protected by dry pipe sprinklers, and three heads operated to extinguish the fire. The fire department was summoned by the automatic water flow alarm activated by the sprinkler operation. Their involvement was not necessary. They helped to clean up the water.

The actual dollar loss, including the water damage, which extended from the third floor through to the first floor in this case, because of lack of quick response to shutting off or controlling the water flow, was under $5,000. The management of that hotel has credited us and the sprinkler system with preventing a total loss to the property.

In another case several years ago, we recommended the client install sprinklers. During the first night that that sprinkler system was in service, a fire occurred in his property from spontaneous combustion of oily rags. One sprinkler head operated, notified the fire department through the automatic water flow alarm, who, in turn, came in and found the situation under control. That property owner even refused to file a claim for the water damage, because his comment to us was, "The sprinklers saved my business."

Just a year ago, a welding contractor, using equipment on a dust collection system in a client's printing plant, caused a fire. Again, three sprinklers functioned, controlled the fire, and in this case, while the insurance—or the client's insurance carrier, property insurance, did not have to respond to the loss because it was a liability on the part of the contractor, that contractor's liability insurance carrier was saved many thousands of dollars, which was a multi-million-dollar printing plant loss had the sprinklers not functioned. The total loss there was approximately $15,000 in water damage as a result of rolled paper damage being involved in it.

I can say that sprinklers do have an impact on the insurance industry both from a rate savings standpoint and from a benefit from control of losses.

I would like to state, or ask, and recommend that the NFPA standards, which are the basis of insurance rating and many times underwriting requirements, be considered as a basis of any legislation that's passed, so that we in the insurance industry do not come up with a dual set of standards, as we do in many respects with dual building codes and enforcement codes.

The other thing which we would look—like to suggest you consider in the bill is water company restrictions on items in sprinkler installations. We're experiencing more and more difficulty with water authorities providing onerous requirements for sprinkler hookups that add thousands of dollars to sprinkler installations which, in many respects, are not necessary.

The American Waterworks Association itself does not recommend reduced pressure backflow prevention on a wet pipe sprinkler system, yet many water authorities are starting to require this form of protection. Those devices cost anywhere from $4-$10,000 apiece.

The other thing that you might consider as an incentive would be tax breaks in the first year of enactment or installation, particularly in retrofit situations, in order to encourage retrofitting. I think the State of Alaska has a very similar situation there that you might refer to.

With that, again, I would like to thank the committee for the invitation of being here and offer any answers to questions that you might have.

[The prepared statement of Mr. Botts follows:]

THE IMPACT OF AUTOMATIC SPRINKLER SYSTEMS
ON
HOTEL AND MOTEL INSURANCE COSTS

Prepared for:
SUBCOMMITTEE ON SCIENCE, RESEARCH AND TECHNOLOGY
of the
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

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March 1, 1989

The Impact of Automatic Sprinkler Systems on Hotel and Motel Insurance Costs

As Manager of the Risk Control Services Department in the Harrisburg, Pennsylvania office of Fred. S. James & Co., Inc., I am often involved with clients in their decision-making process as respects fire protection matters. My duties require that I assist our clients to improve their risks, both from a property and casualty standpoint. In this role, James Risk Control Services many times will recommend automatic sprinkler systems to these clients as a positive means of controlling fire losses and improving the fire safety of their risks. This will involve both safety from fire for their property and personnel, as well as safety to the public that comes into contact with our client.

The Harrisburg James Risk Control Services department is also involved in the design and specification of automatic sprinkler systems. This design work is performed for both insurance clients of James and on a fee basis to Consulting Engineers, Architects, and non-insurance clients. In this role we are occasionally asked to justify the systems we are being asked to design.

One of the first questions that we are asked when we recommend automatic sprinklers to a client is, "How much will I save in my insurance premiums?". The response to that question will always include a question in return, "How much can you afford to lose should you have a fire without the protection that sprinklers will provide?".

The question of insurance cost savings for the installation of automatic sprinklers is always difficult to answer without a complete analysis of all of the factors. One must consider the location of the property in relationship to a satisfactory water supply, the hazards associated with the occupancy, safety of the occupants, the value of the property to be protected, the possible insurance markets, etc. Most often we are able to demonstrate a reasonable savings in insurance costs. One that provides the property owner with an acceptable rate of return on his investment. However, regardless of the rate of rèturn, we will always attempt to sell our client on the benefits of sprinkler protection, regardless of the cost of a system.

In your invitation to participate in this hearing, you indicated that you would be interested in learning about the insurance industry's experience with sprinklers and the impact of sprinklers on insurance rates. Let me address your later concern first, the impact of sprinkler protection on insurance rates.

The Impact of Automatic Sprinkler Systems on Hotel and Motel Insurance Costs

In order to understand the impact of automatic sprinkler systems on insurance costs, one must first understand the development of insurance costs. Most people see the cost of insurance as the premium that they pay for the insurance coverage that they are buying. This **PREMIUM** is in fact the end product of a **RATE** multiplied by a **UNIT OF EXPOSURE**.

Rate is a measurement of the likelihood of loss. A risk more likely to experience a loss should be required to pay a higher price for that likelihood. Steps taken to reduce or control a loss should in turn be rewarded by lower rates. The insurance industry utilizes various methods to recognize these facts.

The Unit of Exposure gauges the severity of a potential loss. For a property insurance contract the limit of insurance based on the value of the property insured becomes the measurement. In liability insurance contracts the measurement is the maximum amount of protection available for any one occurrence of a covered loss.

Thus;

PREMIUM equals **RATE** times **UNIT OF EXPOSURE**

It is fairly easy to comprehend a Unit of Exposure. For property insurance it is the value of the property, whether it consists of the physical building or its contents or both. The unit is generally per $100 of value insured. For liability insurance the unit of exposure can be one of several units, such as, number of autos, beds, rooms, or payroll, sales, area, etc.

Rate on the other hand considers many factors. Fire insurance rates consider items, such as, construction, occupancy, protection (both internal and external) and exposure features. Casualty insurance rates consider items dealing with the overall safety of an operation, such as, the use of hazardous materials, slip and fall exposures, bodily injury potential, building exit capability, etc.

Based on this brief overview of insurance costs, one can see that automatic sprinkler systems will have a greater impact on rates than on the unit of exposure. Additionally, property insurance rates are affected more than casualty insurance rates. Therefore, this presentation will concentrate on the impact of automatic sprinkler systems on fire insurance rates.

The Impact of Automatic Sprinkler Systems on Hotel and Motel Insurance Costs

ISO Commercial Risk Services, Inc. (CRS) operates as an insurance rating organization for the development of both casualty and property insurance rates. For the most part, fire insurance rates developed by CRS are advisory rates which may or may not be used by the individual insurance companies. The Commercial Fire Rate Schedule (CFRS) is utilized by CRS as the basis for development of fire insurance rates for most larger commercial properties and all commercial properties protected by a standard installation of automatic sprinklers.

To understand the difficulty in providing a quick and simple answer to the question of available credits for an automatic sprinkler system, it is first necessary to understand the complexity of the CFRS. Let's take a brief look at what goes into the fire insurance rating process. The CFRS is broken into 12 sections as follows.

Section I, General Rules, provides the basic definitions and rules necessary for rating under the schedule. Definitions are provided for the various kinds of construction materials and for the classification of the six construction types. Another important item is the rule for separate rating of fire divisions.

The schedule first evaluates the primary construction elements in Section II, Basic Building Grade. The exterior walls, floors and roof are graded on the basis of their damageability, recognizing the relative combustibility and fire resistance of various construction materials. This analysis is done on a straight line basis with charges made in points, in proportion to the percentage of each type of construction material. A schedule base of 50 points is added to the basic construction charges. This sum is then modified by a factor to reflect the effect of occupancy (contents combustibility) on the construction.

The net grading, after modification, is the Basic Building Grade (in points) to which other charges and credits are applied to produce the Final Building Grade (also in points).

Secondary Construction Charges are applied in Section III. This step in the rate schedule provides for the addition of secondary or "non-structural" building features. These are principally charges for area, height, vertical openings and combustible interior or exterior finish. The sum of these charges, in percent, are applied to the Basic Building Grade, together with the Net Occupancy Charge.

The Impact of Automatic Sprinkler Systems on Hotel and Motel Insurance Costs

Sections IV through VII provides an analysis of the Occupancy of the risk. In other words, the hazard of the occupancy is graded. The occupancy analysis consists of a primary charge for the occupancy (Basic Occupancy Charge) based on its combustibility and inherent hazard, with supplementary charges as required for causative or special hazards. A simplified occupancy listing has been developed with elimination of a large number of minor differences between similar risks, and with emphasis on the type of material being handled rather than the name of the occupancy. A formula is applied to develop the charge for multiple occupancy risks. In addition, a separate modification is provided for buildings of non-combustible or fire resistive construction. The Net Occupancy Charge, in percent, together with the total Secondary Construction Charge is applied to the Basic Building Grade to produce the Unexposed Building Grade, in points.

An analysis of the exposure hazard from an adjoining building is applied in Section VIII as the next step in the rating process. The exposure analysis method bases the exposure charge on the general hazard of the exposing building. The exposure charge is obtained from the Exposure Hazard Charge Table which incorporates the distance between the two buildings, the type of exposure wall construction and the exposure hazard. This charge is then further modified according to the type of Exposure Protection provided by the facing wall of the exposure and the facing wall of the building being rated; this modification is accomplished through an Exposure Condition Table. The exposure charge thus determined is added to the Unexposed Building Grade to produce the Exposed Building Grade.

The protection provided from outside the facility is recognized in Section IX of the schedule. This is handled by application of a factor applied to the Exposed Building Grade to produce the Gross Building Grade. This factor is based upon the public protection class of the municipality which is developed through the application of the Fire Suppression Rating Schedule (FSRS), also administered by ISO Commercial Risk Services, Inc..

Section X of the CFRS provides for Internal Protection Credit. Fire extinguishers, watchman service, alarm systems, automatic sprinklers, etc. are recognized and a percentage credit is given as the last step in determining the Final Building Grade.

A Building Conversion Factor is applied in Section XI. The CFRS produces a Final Building Grade in points which must be converted to an 80% Coinsurance rate in dollars and cents. This is achieved by the Building Conversion Factor which is based on the general occupancy class and construction type of the building being rated and varies from state to state.

The Impact of Automatic Sprinkler Systems on Hotel and Motel Insurance Costs

Section XII develops the Contents Rates for the risk. Included is a separate calculation which begins with the selection of a susceptibility charge. The Susceptibility charge varies with the relative damageability of the contents. A susceptibility grading system of five categories is used. This susceptibility charge is modified by a Contents Conversion Factor, and the result is added to a contents base. The Contents Base is the Gross Building Grade modified by the Building Conversion Factor. Credits for Internal Protection systems are then deducted to produce a Final Contents Grade. This grade is then converted to the 80% Coinsurance rate.

Before this 80% coinsurance rate is used to develop a premium, additional factors are applied. The first of these factors makes a direct adjustment to the rate to reflect loss experience of the various occupancy classifications. This factor is modified from time to time based on a statistical analysis of premiums charged versus the losses reported.

As was stated, the rates developed by ISO Commercial Risk Services, Inc. are advisory in nature. Additional adjustments in the form of credits for retention of a part of the risk by the insured in the form of a deductible, spread of risk locations, good management, loss prevention practices, etc. may also be applied to either a rate before premium calculation or to the premium itself. Generally these adjustments reflect the posture of the individual insurance company as respects its competitive nature, experience with a particular class, and underwriting philosophy.

This brief overview of the fire insurance rating process is not the only means of arriving at a premium to be paid by an insured for property insurance coverage. It is, however, one of wide acceptance used by the majority of the stock insurance company industry. The fire insurance rate development process outlined here is also one for which you can clearly demonstrate the effect of the addition of various forms of risk improvement, including automatic sprinkler protection.

With the foregoing data as background, let's look at two specific risks in the Hotel/Motel class in which automatic sprinkler protection has been installed. In both cases we can examine the difference in premium costs, both with and without the protection and compare this cost to the cost of the protection system. In the first case, the risk is a large motel style facility, with restaurant, and a detached convention center and was retrofit with sprinklers in the motel and restaurant section only. In the second case the facility is a garden type of motel with an attached restaurant. The entire facility was equipped with automatic sprinklers at the time of its construction.

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on
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The first risk is a large two and three story motel facility with a large commercial restaurant operation located within the main building and a detached convention center. The structure contains a total floor area of approximately 144,500 square feet, consisting of 71% masonry wood-joisted, 14% masonry non-combustible, and 15% fire resistive construction. A total of 265 rooms are provided. Present property insurance is based on 100% replacement cost values of $8,340,000. on the building and $1,400,000. on the contents.

Recommendations were made to sprinkler the facility in 1981 based on the growing trend to require automatic sprinkler protection in residential type of properties and the then recent fire losses in major hotel facilities. At the time, however, the insurance rate structure on the property would not provide a reasonable return on the investment for sprinklers coupled with a recent change in ownership. However, in 1985 with the adoption in the previous year of requirements within the Pennsylvania Fire and Panic Act to retrofit this class of property with complete smoke detection systems, the then current insurance carrier indicated that in order for them to continue to provide the insurance coverage, some form of protection (detectors or sprinklers) had to be installed. The recommendation was again made that sprinklers be considered in lieu of the smoke detection system. This approach was suggested with the knowledge that a greater reduction in the insurance rate was available for the sprinkler protection.

The owners finally agreed to consider automatic sprinkler protection and requested that bids be obtained for the work. Upon reviewing the bids, it was decided that the Convention Center building would not be sprinklered at this time, but that the underground water supply mains would be prepared for the future protection of this facility. The insurance carrier was satisfied with this approach since they were primarily concerned with safety to life in the motel portions of the risk.

Sprinkler installation was begun in the existing motel facility in June, 1986. The total cost of the installation, including all extras and the underground water distribution system required to supply the sprinklers was approximately $326,700. In addition to the work performed by the sprinkler contractor, hotel personnel performed some work to open and/or close ceilings and other areas requiring access for the sprinkler installation to proceed. This cost was borne by the owners and considered within the normal maintenance requirements for the facility. Work was substantially completed and the sprinkler systems left in service in late May, 1987.

The Impact of Automatic Sprinkler Systems on Hotel and Motel Insurance Costs

The entire sprinkler installation consists of two wet pipe and two dry pipe sprinkler systems containing a total of over 1,800 sprinkler heads. The systems are hydraulically calculated and the maximum water demand is 607 gpm at 46 psi. Approximately 1,020 feet of 8" and 150 feet of 6" underground water main was required. The main is supplied by a connection to the public water supply system at the risk property line.

The cost per room unit was approximately $1000 exclusive of the underground water mains.

The current fire insurance rate for the property was promulgated by ISO Commercial Risk Services, Inc. and bears an effective date of Oct. 31, 1988. The adjusted net 80% coinsurance rate on the building is 0.459 and on the contents is 0.647, per $100 of insurance per annum. Using the current 100% insurance values produces an annual premium of $47,338. without any additional adjustments for deductible or other underwriting factors. If the credit for automatic sprinkler protection is removed from the current rate schedule, rates of 2.302 and 2.536 are produced on the building and contents, respectively. Applying these rates to the current 100% insurance values produces an annual premium of $220,584., again without benefit of any further adjustments. This indicates an annual saving in fire insurance costs of $173,246. If you were to apply the credits being offered by the present insurance carrier, a net savings per year of approximately $80,000. to the fire insurance premium would be realized.

Again, it is necessary to point out that this comparison does not reflect any additional adjustments to the premium that could be made for deductible or other insurance company underwriting factors. This also does not reflect any savings in the area of Business Interruption insurance, for which premium development utilizes the building fire rate as a base. Any premium credit which might have been given in the liability portion of the premium for the risk has also not been considered.

The second risk is a two story garden type motel property with an attached restaurant operation. The structure contains a total floor area of approximately 62,800 square feet of wood frame construction. A total of 120 rooms are provided. Present property insurance is based on 100% replacement cost values of $3,106,000. on the building and $826,000. on the contents.

During the preliminary planning stages in early 1985 a suggestion was made to the owners to sprinkler the facility. A feasibility study accompanying the suggestion indicated that an annual fire insurance premium savings of approximately $80,000. might be possible. With this projection, the owners decided to pursue the sprinkler installation and requested the architect to incorporate the system in the plans.

The Impact of Automatic Sprinkler Systems on Hotel and Motel Insurance Costs

Construction of the facility began in early 1986 and included the sprinkler system. The initial estimate of construction costs was $2,500,000. to $2,700,000. The sprinkler cost of $135,000 was included in this estimate. Work was substantially completed in late 1986. Sprinkler system testing was completed and the system left in service on December 12, 1986.

The entire sprinkler installation consists of two dry pipe and one wet pipe systems containing over 1200 heads. The systems are hydraulically calculated and the maximum water demand is 507 gpm at 123 psi at the pump discharge. The systems are supplied by a booster fire pump rated at 500 gpm at 125 psi. The pump is supplied through 230 feet of 6" main, which is supplied by a connection to the public water supply system at the property line of the risk.

The final cost of the sprinkler protection per room unit was approximately $1,125.

The current fire insurance rate for the property was promulgated by ISO Commercial Risk Services, Inc. and bears an effective date of August 12, 1987. The adjusted net 80% coinsurance rate on the building is 0.947 and on the contents is 1.321, per $100 of insurance per annum. Using the current 100% insurance values produces an annual premium of $40,325. without any additional adjustments for deductible or other underwriting factors. If the credit for automatic sprinkler protection is removed from the current rate schedule, rates of 3.551 and 3.790 are produced on the building and contents, respectively. Applying these rates to the current 100% insurance values produces an annual premium of $138,048., again without benefit of any further adjustments. This indicates an annual saving in fire insurance costs of $97,723. If you were to apply the credits being offered by the present insurance carrier, a net savings per year of approximately $44,000. to the fire insurance premium would be realized.

Again, it is necessary to point out that this comparison does not reflect any additional adjustments to the premium that could be made for deductible or other insurance company underwriting factors. This also does not reflect any savings in the area of Business Interruption insurance, for which premium development utilizes the building fire rate as a base. Any premium credit which might have been given in the liability portion of the premium for the risk has also not been considered.

Both of these risks indicate a worthwhile savings in the fire insurance area. However, it is necessary to point out that these examples are located in Pennsylvania and risks of identical character located in other states or rated under a different rate schedule may not reflect the same results.

The Impact of Automatic Sprinkler Systems on Hotel and Motel Insurance Costs

However, what may be more important from an insurance standpoint, a standard insurance market was willing to accept both risks. In the first case, the insurance carrier was not willing to continue to underwrite the risk from a safety to life standpoint unless some form of protection was provided. While this problem did not arise for the second risk, it is safe to assume that placement of the insurance for a two story frame motel, without sprinkler protection, may have been difficult.

We have spent a great deal of time in analyzing the impact of automatic sprinkler systems on property insurance costs. Now let's take a brief look at the casualty insurance cost picture.

Casualty insurance rates developed by CRS are also advisory in nature. These rates are actuarial and based on statistics from past losses and premiums paid by the various classes of risk. In essence, casualty insurance rates are developed by class. That is to say, if you are rating the liability portion of an insurance contract for a hotel, the same liability rate applies to all hotels in a particular territory, regardless of the hotel's construction or protection features. The only difference in liability insurance premium from one hotel to another hotel next door, would be the result of a difference in the "units of exposure", or the insurance company underwriting philosophy as respects the application of various credit factors.

So much for the insurance cost question. Let's look at the experience question.

The value of automatic sprinkler protection to the insurance industry and to industry in general, as well as the general public, is borne out in the statistics of the National Fire Protection Association (NFPA). The dollar loss per reported fire is far less for sprinklered properties than for non-sprinklered properties. The fact that there has never been a multiple death fire in a property with a properly installed and functioning sprinkler system can not be overlooked. Over 97% of the fires in sprinklered properties are extinguished or controlled by the sprinklers, in most cases by 10 or fewer heads. In light hazard risks, such as hotels/motels, three or fewer heads operate.

The Impact of Automatic Sprinkler Systems on Hotel and Motel Insurance Costs

Maybe a few examples of the experiences that James Risk Control Services in Harrisburg has had will be an indication of the insurance industries experience with automatic sprinklers.

Approximately six months after the sprinklers were put into service in the first hotel risk we used in the rate example, a fire loss occurred. The fire is believed to have been arson caused and was set in a third floor meeting room near a window. Due to the location and nature of the fire, it is believed that the fire would have easily extended into the blind combustible attic space and perhaps destroyed the entire facility. The area was protected by dry pipe sprinklers and three heads operated to extinguish the fire. While the fire department was summoned by the sprinkler water flow alarm, their involvement was not necessary. The actual dollar loss, including water damage, as a result of this fire was under $5000. Management has credited the sprinkler system with preventing a total loss.

In another case, several years ago, we had recommended a client install sprinklers. During the first night that the sprinklers were in service, a fire of spontaneous combustion occurred. One sprinkler operated and extinguished the fire. The fire department was called by the automatic water flow alarm and found the situation under control. We did not here of this loss until several weeks later when our producer of the account was advised of the fire. When he suggested to our client that he could submit a claim for the water damage that had occurred, the client refused, stating, that had it not been for the sprinklers he would have been out of business.

Just a year ago, a contractor using welding equipment on a dust collection system in a client's printing plant, caused a fire. Again, only three sprinklers operated and controlled the fire. While our client's insurance did not have to respond to this loss caused buy the contractor, the contractor's liability insurance carrier was spared a major loss as a result of the response of the sprinkler system.

Based on these few examples, I believe you can see that the insurance industry benefits dramatically from automatic sprinkler systems.

James Risk Control Services

RICHARD E. BOTTS, P.E.

VICE PRESIDENT MANAGER - RISK CONTROL SERVICES

Mr. Botts is Vice President-Manager of Risk Control Services for the Harrisburg, Pennsylvania, office of James. He has an Associate Degree in Pre-Engineering from Harrisburg Area Community College. He is Registered in Pennsylvania (by examination) as a Professional Engineer in the Fire Protection and Safety discipline.

As Vice President-Manager of Risk Control Services, Mr. Botts supervises the operation of the Risk Control Services Department in the Harrisburg, Pennsylvania office. As a Professional Engineer, he has experience working with design professionals in order to assure various insurance, fire, and safety Codes and requirements are built into new and renovated facilities. Mr. Botts has had heavy involvement in the property conservation areas of the Food Processing (fruit), Distribution Warehouse and Metalworking Industries.

Mr. Botts' skills in the development, design and review of protection features for various facilities is utilized to assure improved property conservation measures, reduced insurance costs, and compliance with various Building and Fire Protection Codes. He serves on the Pennsylvania Fire Service Professional Qualifications Board; the Fire Science Advisory Committee of Harrisburg Area Community College; and the Public Safety Advisory Committee of Susquehanna Township. As a Regional Vice President of the American Society of Safety Engineers, he serves on the Society's Board of Directors. Mr. Botts has been named Safety Professional of the Year for both his Chapter and his Region within ASSE.

His past experience includes six years with a major multi-line insurance carrier. Mr. Botts has been Manager of Risk Control Services for James for more than 17 years. He also has six years of experience in the Engineering Department of a large structural steel fabricator and has worked for a Civil Engineering Design Consultant.

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Member - National Fire Protection Association
Member - National Safety Management Society

SPECIALTIES: Skilled in all phases of Fire Protection and Safety Engineering, Life Safety Code, OSHA., Rate Analysis, Various Building and Fire Prevention Codes, and Risk Management Techniques.

TECHNICAL EXPERIENCE: Twenty-three years experience in the insurance industry, including:

Six years with Insurance Company of North America, Technical Services Department;

Seventeen years with Fred. S. James & Co., Inc., of Pennsylvania as Manager of Risk Control Services.

Serves on Fire Science Advisory Committee at Harrisburg Area Community College, teaches an insurance course in the program, and was involved in initial establishment of the Fire Science Technology curriculum.

Regional Vice President of the American Society of Safety Engineers and Past President of the Central Pennsylvania Chapter, American Society of Safety Engineers.

Speaker at numerous conferences, seminars and training programs, including National Fire Protection Association; H.A.C.C., Community Resources Institute; Pennsylvania Association of Institutional Engineers; Central Pennsylvania Health Care Safety and Security Council; Pennsylvania League of Cities; Institute of Scrap Iron and Steel; Dauphin County Volunteer Firemen's Association; and Governor's Safety Conference.

Active in many Fire Service organizations. Thoroughly familiar with Municipal Fire Service organization and insurance grading. Serves on Pennsylvania Fire Service Professional Qualification Board and Application Review Committee of the Volunteer Fire and Ambulance Company Loan Program.

I. S. O. COMMERCIAL FIRE RATING SCHEDULE–SURVEY

Information contained in this survey is for the sole purpose of calculating a fire insurance rate. It is not for the purpose of making property loss prevention or life safety recommendations, and none are made.

Community ______________________ State ______
Location ______________________
____
Owner: ______________________
Height ________ Stories + ________ Bst. Bldg. Comb. Class C– ________

RATING REF.		
DATE OF SURVEY		

SCOH Bldg. Code ______ CSP Constr. Class ______
ICC Bldg. Code ______ Prot. Class ______
CSP Bldg. Code ______ EC Symbol ______

OCCUPANCY

Location	FLOOR	Floor Area	CONS.	SUSC.	Description of Occupancy	[illegible]	Occupancy Codes			% Charges		Total Occy. Charge
							SCOH	ICC	CSP	Basic	H of O	

TOTAL ______ C-1 + C-2 Area ________ % of total

BUILDING H of O: ☐ None Chargeable

TOTAL	

EXPOSURE: ☐ None Chargeable

This Building					Dist.	Exposing Building						Analysis		CHGE
Side	Wall Constr.					Wall Constr.				OCC	L-H	E-H	E-C	
		U	S	B			U	S	B					
		U	S	B			U	S	B					

Firewall: ☐ Single CL. A Fire Door
Passageway ______ Ft: ☐ Prot. ☐ Comb. ☐ Open
Special:

TOTAL ______ Pts

INTERNAL PROTECTION: ☐ No Credits Apply

☐ SP & H; ☐ Port Exting.: ______________________ a. %
☐ AFA–Gr ___: ☐ Watchmen: ☐ Prop. ☐ Central Sta. ______________
☐ Part'l. AS. ______________________ b. %
☐ Other

Credit Factor = (1.00 – a.) X (1.00 – b.) = FACTOR ______

CONTENTS RATES

Gross Bldg. Grade ______ Pts. X Bldg. Conv. Factor ______ = ______ Pts. Contents Base

Tenant	Susc.		X Conv. Factor	= Conv. Chge.	+ Conts. Base	= Gross Grade	Int. Prot. Factor	Final Grade	x .001 = 80% Rate
	S-	Chge.							

A PERCENTAGE CHARGES

Occy.: Highest		
____ Others X .15..........		
Building H of O;..........		
Net. Occy. Charge..........		
Occy. Mod. Factor ______	▨	▨
Modified Occy. Charge		
Secondary Constr.		
Calculation Base	100	100
Total Percentage Charge		

B BASIC BUILDING GRADE

Base Points	60	60
Combustible Points		
Other Points		
Total		
Constr. Mod. Factor ______	▨	▨
Bldg. Grade (minimum 35)...		

C BUILDING RATE

Unexpo. Grade (A X B)		
Exposure Charge		
Exposed Grade............		
Prot. Factor ______	▨	▨
Gross Bldg. Grade		
Int. Prot. Factor ______	▨	▨
Final Grade		
	▨	▨
X .001 = Unconverted Rate ..		
Bldg. Conv. Factor ______	▨	▨
80% Coins. Rate...........		

Bldg. Dimensions ____________________

largest floor area .... = __________ Sq. ft.
_____ % of _____ other floors = __________ Sq. ft

__________ Effective area

BASIC CONSTRUCTION:

WALL DIMEN-SIONS	MASONRY WALLS		FIRE RES. WALLS		NON-COMB. SLOW BURN	Description of Wall Materials (Other Than Combustible)	% of Total	Points	Charges	
	W	Thick	D	Rating					Comb.	Other
		"		hr					▨	
		"		hr					▨	
		"		hr					▨	
		"		hr					▨	
		"		hr					▨	
		"		hr					▨	

☐ Wood iron clad; ☐ Masonry veneer ☐ Combustible
_____ % Wall Perimeter; Columns in non-bearing masonry walls: ☐ Unprot. metal: ☐ Combustible
_____ % Wall Area; Panels in masonry or fire res. walls: ☐ Non-comb.; ☐ Glass: ☐ Slow burning
_____ % Wall Area; Panels in masonry or fire res. walls: ☐ Combustible
Special Conditions (Describe) ____________________

DIMENSIONS OR LEVELS	MASONRY or F.R.		NON-COMB. SLOW BURN	Description of Floor & Roof Materials Including Supports & Assembly (Other Than Combustible)	% of Total	Points		
	D	Rating					▨	
		hr					▨	
		hr					▨	
		hr					▨	
		hr					▨	
		hr					▨	
		hr					▨	
		hr					▨	

☐ Wood iron clad. ☐ Heavy timber ☐ Combustible
☐ Lowest Floor Level Combustible
Special Conditions (Describe) ____________________

Total Combustible Points _____
Total Other Points _____

SECONDARY CONSTRUCTION:

Vertical Openings: Type of Protection ☐ V-1. ☐ V 2. ☐ V-3. ☐ V-4. __________

Area-Height Calculated Effective Area __________ Sq. Ft. = _____ % x _____ Height Modification (if applicable) = _____ %
Roof Surface: ☐ None chargeable: ☐ Non-std., (describe) __________ _____ %
Comb. Roof Space: ☐ None chargeable; ☐ Non-std.: _____ % Total roof area: __________ _____ %
Comb. Floor Surfacing: ☐ None chargeable: ☐ Floor Surface with _____ " air space _____ % of area _____ _____ %
Comb. Interior Walls or Partitions: ☐ None chargeable: ☐ Non-std. (describe) __________ _____ %
Comb. Interior Finish: ☐ None chargeable: ☐ Non-std. (describe) __________ _____ %
Comb. Exterior Finish: ☐ None chargeable ☐ Non-std. (describe) __________ _____ %
Comb. Exterior Attachments: ☐ None: ☐ Enclosed: ☐ Open: _____ Total sq. ft.: __________ _____ %
Building Condition: ☐ Not Substd: ☐ Moderate: ☐ Major: ☐ Extreme: __________ _____ %
Additional Rating Details: ____________________ _____ %

Total Secondary Construction Charges _____ %

Mr. **Walgren**. Thank you very much, Mr. Botts. That's powerful testimony and, I think, nicely specific on the financial numbers, and I think that can make the potential in this area real to all of us.

I wanted to ask Mr. Henry if you could elaborate a little bit more with us on the lessons from that Bethlehem fire, and I—you indicated that one of the problems was a presignaling smoke detector system.

It's hard for me to understand how that could have happened up there inasmuch as I don't know why smoke detectors don't protect you from smoke. I had always thought that people might have been really endangered by the fire, but I thought if you had a good smoke detector, and smoke is the only thing that really infringed in your area, that you were going to be all right. But these people did not die from fire, they died from smoke, in a room with a smoke detector. How is that?

Mr. **Henry**. I guess the real problem—you know, as far as we're concerned, a presignaling system is unacceptable. But the fact that the building was built in 1922 and it didn't have to comply with the current Fire and Panic regulations, they get by with this installation without the notification that the Department of Labor and Industry, and they were unaware of the presignaling system.

Mr. **Walgren**. What is the presignaling system at this point?

Mr. **Henry**. Well, a presignaling system, Mr. Chairman, is the fact that the smoke detectors, like in each individual living area, the only—when the smoke detector registered a contaminated atmosphere, only that individual smoke detector went into alarm state, just in that individual room; it did not activate the house or the general fire alarm nor any other alarm, just that individual detector in that individual room.

However, the system was monitored by Altronic Security Company, and there's an enunciator panel down at the desk, and soon as the detector went into alarm state, they looked, and a light registered that that smoke detector is in alarm state in room 510.

Instead of them reaching up and pulling the master box which goes directly into central dispatch, into the fire department, they didn't do that. They then—the people at the desk dispatched two employees up to check to see the extent of the fire, and then, you know, it was just—even the detectors out in the corridors did not activate the interior fire alarm. The only way that can be activated was by pulling it manually. Some of the occupants told us that the only way that they found out that there was a fire in the hotel is, they heard the sirens, they looked out the window, and they saw the fire apparatus pulling up in front of the building, and it was just human error more than anything.

The system was not designed to meet today's standards, and, naturally, you know, after the fact, that's going to be rectified.

Mr. **Walgren**. Why wouldn't those smoke detectors give enough warning in the rooms where these people died, that they would have been getting out before the situation became life threatening?

Mr. **Henry**. Well, the only thing that I can tell you is because of the tremendous construction of that facility.

Back in 1922, the interior walls there were four inches of concrete. It was a well—it was built like a fortress, and I just—the sound, the audible, was just not enough to alert the people on the individual floors.

Mr. WALGREN. Do you want to have any final thoughts? Okay. Why don't you go ahead and do that?

Mr. BOEHLERT. Excuse me. I have to leave, but before I do so, I want to thank all of you for the excellent testimony, and, Mr. Botts, you've been particularly helpful in terms of focusing on answers to the questions, you know: This is an unreasonable cost to impose on hotels and motels.

If I understand correctly what you were telling me—and, incidentally, we have already learned that the cost of installation for a sprinkler system is about the same as the cost of installing carpet; that's no great burden. But you're telling me that the insurance premiums would allow a payback period for the installation of three to five years. Is that correct—the reduced insurance premium?

Mr. BOTTS. Yes, sir.

The key to this is, in these two instances that is the case. There may be situations that that does not apply because of factors that are entered into the insurance rate makeup. For example, the rate has a building conversion factor that goes into it that changes by construction class. Those types of factors could have a bearing.

Generally speaking, particularly in general industry—mercantile and other types of industry—we are safe when we state to a client that, "We can anticipate that you will save approximately 50 percent in your fire insurance premiums as a result of installation of sprinklers." Many times, in a low-hazard occupancy, such as hotels, schools, and so forth, you are not able to retain that high a level.

One of the things that has happened in the rate-making process: A few years ago when ISO Commercial Risk Services adopted the now commercial fire rate schedule, there is an area charge that's applied. One of the nice things that happens: That area charge years ago was never applied to low-hazard occupancies, it is today, so that the larger the area, the higher a charge enters into the rate for the development of that rate.

In a sprinklered facility, the area charge is reduced to zero in the commercial fire rate schedule. That is one of the big factors that helps now with lower-hazard occupancies in getting a little bit better rate credits.

At one time in Pennsylvania, we had a nursing home—to give you an example of how rate situations have changed—where we notified ISO that we were going to shut off the sprinkler system and wanted it rerated as a nonsprinklered property because the rate for a nonsprinklered nursing home turned out lower than it did for a sprinklered nursing home.

Mr. BOEHLERT. How long ago was that?

Mr. BOTTS. That was all because of the ambiguities of the rate makeup and the code adjustments that were being applied.

Mr. BOEHLERT. How long ago was that, Mr. Botts?

Mr. BOTTS. I would say that was probably in the late seventies.

Mr. BOEHLERT. You couldn't do that now.

Mr. BOTTS. No, you wouldn't do it today.

Mr. BOEHLERT. No Medicare.

Mr. **Botts**. We weren't going to shut it off, we were just going to tell them we shut it off and let them rerate the property as a nonsprinklered risk.

Mr. **Boehlert**. I really appreciate that. I mean, really, to stretch it, if you're as enthusiastic and supportive of this legislation as I am, you can argue very forcefully, and I think with some substantiation, to the industry that, we're going to help you make a profit in the long run, because those lower insurance premiums are going to stay in effect—

Mr. **Botts**. That's correct.

Mr. **Boehlert**. —when the payoff period is over.

Mr. **Botts**. The big key that's not recognized in a rate situation with sprinklered hotels or motels is, of course, the advantage of the loss of, or savings, if you will, into potential for liability risk.

I believe it was testified here earlier that there's been billions of dollars in loss so far as a result of the Dupont Plaza Hotel. Most of that is not property damage loss, that's in liability suits being brought. There is where the big savings would be to the insurance industry, yet there is really no true mechanism to recognize that sprinklers have a bearing on it.

The underwriter has a prerogative of providing credits for a sprinklered property, but he is limited with just how many credits he can provide, because, generally speaking, a liability insurance rate is a class rate. The underwriter goes to a manual and applies a rate out of the manual times the limit of liability that's being applied.

Mr. **Walgren**. So we really should be looking at the insurance industry to drive this bill like a nail and a hammer.

Mr. **Botts**. You sure should.

Mr. **Walgren**. Because they would be benefiting by multiple billions.

Mr. **Boehlert**. Thank you very much, Mr. Botts, Mr. Henry, Mr. Jordan.

Mr. **Walgren**. We just wanted to cover some ground with Nevada here, and can you give us—and I apologize for being out of the room, but just a brief description of the laws that were put in effect in response to the hotel fires in Nevada?

Mr. **Jordan**. Yes, sir.

Mr. Chairman, the Nevada law in regards to hotel properties was not intended to protect the structure, it was intended to protect the exitways to exit the occupants out of the structures.

So when you talk about sprinkler systems, you have to differentiate between a partial system for exit and corridor protection and room protection in a full building's system, and, generally, when you are talking about credits—and, of course, fire fighters always like full sprinkler systems—that's what you ask for, if you can. And we do, for instance, in all our State buildings now since last July when I issued the order—all State-owned or -leased property has to be a fully sprinklered system; it's not a partial system.

However, in this case, Nevada's law was to provide life safety, not property protection, and that's something that needs clarification in the language of the bill or in the drafting of the regulations at that level. Not all communities could support with a public water system the required flows and residual pressures for very large structures, and of course we operate in this Nation under four different building codes, unfortunately, so you have a problem with how much area you can have in one type 5, one-hour building or what you can have in a type 2 fire-rated building, and the occupancy class; R is for hotels; I is for hospitals and nursing homes. So it's a—there's a formulation that has to be considered.

Nevada's law considered that if, for instance, you had a public occupancy that was in a 12,000-square-foot building and there was 5,000 feet of public assembly space for a dance hall, a casino, or whatever—a theater—then that space and that exiting in and out of that building would have to be sprinklered. That was the basic short version of the law.

There were elevator recall fire alarm systems with 80-decibel ratings, one-way paging systems so you could talk from the desk to the people in their rooms and tell them to get up and get out of there, and in Nevada that's very important because we're a 24-hour State; we work. Now, especially with the mining industry, that's compounded, and you have people working all the time; they don't have that quiet time.

There were requirements to tie fire alarm and sprinkler water flow alarms together, which is in our fire marshal regulations. There were other facets that dealt with emergency lighting for exitways, so you don't go out into a dark corridor or a dark room. If the power went off in this room, I'm sure there's a generator some place. Hopefully, it will start up within ten seconds and provide lighting. If not, most of our communities have installed—properties have installed battery-operated lighting wired into the system. So if the power comes on, the lights come on immediately, and there's no probable—probability of panic or trouble finding an exit.

So Nevada went beyond the lodging industry; it went into all public spaces.

Mr. **Walgren**. But you only went with respect to life safety and exit.

Mr. **Jordan**. It was a life safety measure; it was not.

Now some of the building owners were approached, and their insurance carriers recommended—which was a credit to the insurance industry, along with our fire marshals—that they provide full protection and rated out on a risk management basis with their insurance carrier—and it is cost effective, very likely.

Mr. **Walgren**. What we're proposing for hotels is essentially what you have there for life safety and exit.

Mr. **Jordan**. I would hope so, in the sense that it would mitigate the life safety hazard to the occupants. I would urge that consideration be given in the language, however, for some incentive towards, or some recognition of total property protection, total coverage within the properties. You never really know where the fire is going to start, and a fire sprinkler, of course, is the fire fighter's best friend, so they need that additional consideration.

You must remember also, of the 28,000 to 30,000 fire departments in this country, a lot of them are volunteer—the majority of them are volunteer—and a lot of them are very understaffed, during daytime hours, for instance. I've been there; I know that that's statistically a fact, and it's important that that recognition be given that there are some systems.

You have a problem also, and we've had this in Nevada, and California, and it passed what was the fry law, if you recall the contractor that was gluing on the sprinkler heads on the school ceilings with no water, of course, attached, just the head, and I noted in a recent issue here there's a grand jury indictment of a contractor that was putting in faulty systems. We've put that law in in Nevada, and we hope that will pass this session—we're currently in session—to make it a felony to put in a system and you know it doesn't work or it won't work to do what it's intended to do. We think that's most serious, and we applaud California's effort in already passing that.

We also have a law that assessed values—we found the assessors have picked up the costs of the sprinkler systems and added it to the assessed value of the building. We think that's unfair, and Nevada is now considering a law that would delete that over the next few years, so it's treated more as a property tax and not a building assessment value, which is about .035 now on our building assessment. So, you see, it would be another incentive to the owner; he wouldn't have to pay a tax on something.

I just introduced last Friday two bills to ensure that the water utility companies can only charge what it costs to make the connection and not an exorbitant fee as a source of revenue, which some of them, unfortunately, have done, and that they cannot charge for water for standby services, which a lot—a lot of them will do it if they can get away with it, and they're doing it all over the country both for fire hydrants and sprinklers, and I think that's most unfair. The total amount of water usage is much less, 15 and 20 gallons a minute out of a sprinkler head, and three average heads, than 1,000 gallons a minute coming out of four or five fire streams, which is—if you've got the people to produce that in a given amount of time.

But Nevada's law addressed a whole spectrum because of the fire loss, and we have a rural State by nature. We have two distinct metropolitan areas, and the rest of it is rural.

I do have a little problem with the Congress, as usual, passing things off to the State, like they did under SARA, Title III, and tell us to go do a bunch of things, and of course there's no resources for that. But in this case, that's not an issue. We can provide the information that's needed.

Mr. WALGREN. Coming back to this Bethlehem fire, Mr. Henry, it would seem that that's an example of how smoke detectors are just not enough, because those people died in rooms where there were smoke detectors.

Mr. HENRY. Absolutely. Absolutely.

Mr. WALGREN. You've got to stop the fire before it—

Mr. HENRY. You can't use one in lieu of the other; you need both. You need the early detection, but you need the quick responsiveness of extinguishment, sprinkler systems.

It's like Mr. Botts pointed out as well as Mr. Nesbitt and Chief Hilton. You know, when you look at the data, 60 percent of all fires in buildings in sprinkler-protected properties are extinguished totally by the sprinkler system; 36 percent will hold that fire in check at its point of origin until an outside source, who could be a maintenance man, fire department, or whatever—you know, to complete extinguishment. That's 96 percent perfection, and how much closer can you get?

That's when I said earlier about, we're not taking advantage of common sense based on our experience. Experience teaches us, the best degree of safety is not to have a fire at all. The second best is to have a functional sprinkler system within places of public assembly and residential occupancies; that's the name of the game.

Mr. **Jordan**. If I might, Mr. Chairman, I'd like to add to Mr. Henry's remarks, you need both. You need both types of protection for life safety. The thing that's quite often overlooked is the occupant's reaction time to an emergency signal. In this case, it's a prime. There wasn't much, or there wasn't any, because they couldn't hear it.

The second thing we overlook is the response time. It takes some of us, particularly us now that are in the senior citizen category, a little longer to get around the golf course than it used to.

So if we don't have the systems in place tied together, properly supervised—and you can have pre-action sprinkler systems just as well as pre-action fire alarm systems that depend upon another intermediate function, which we're dead set against, before something else happens. You need both of those things for life safety.

Mr. **Walgren**. Okay. Well, I want to thank you very much, all of you, and you've been a wonderful resource to us, and we know you will continue to be, because we're going to have to be consulting with you as this bill goes forward. But, as you can tell, with Mr. Boehlert's commitment and a Republican administration, we are leading with our right hand, as they say, and I know that there's a very broad bipartisan consensus in the House that supported this bill before. We are going to do everything we can to see if we can't take a significant step forward here. So thanks very much for giving us the real support for that.

I wanted to say one other thing just for the record. We did invite the Hotel/Motel Association today to participate in our hearings, and they declined to send a witness, but they will be sending written testimony for the record, which we'll certainly take into account.

Thank you.

[Whereupon, at 3:45 p.m., the subcommittee was adjourned.]

APPENDIX

STATEMENT
OF THE
AMERICAN HOTEL & MOTEL ASSOCIATION
on H. R. 94
"HOTEL & MOTEL FIRE SAFETY ACT OF 1989"

BEFORE THE

SUBCOMMITTEE ON SCIENCE,
RESEARCH & TECHNOLOGY

OF THE

COMMITTEE ON SCIENCE,
SPACE & TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

MARCH 2, 1989

The American Hotel & Motel Association appreciates the opportunity to comment on H.R. 94 and, generally, on the subject of hotel and motel fire safety.

The American Hotel & Motel Association is a federation of affiliated lodging industry associations located throughout the United States, Puerto Rico, the Virgin Islands and the world. It represents almost 9,000 member properties comprising more than 1.4 million rooms.

Background

AH&MA has pursued discussions on the subject of hotel and motel fire safety with the subcommittee and its staff for over a year. Last year, we had a strong interest in questioning data, that had been publicized as accurate, which characterized the status of fire suppression systems in the lodging industry as virtually non-existent. This led AH&MA to contract with Tri Data Corporation, a leading fire research organization, to examine the usage of smoke detection equipment and automatic sprinkler systems in the lodging industry. We request that the attached report be submitted in full for the record.

The report is limited by two factors. First, AH&MA is a federation of voluntary trade associations. It is not a standard setting organization. Secondly, by the very dynamic nature of the lodging industry the figures we reported were likely out of date prior to the ink drying on the paper. Indeed, a snapshot survey conducted by the General Services Administration, the federal agency responsible for regulating and monitoring the travel of federal employees, some months after our data collection appeared to not only validate our figures but indicate our estimates were quite conservative.

Over a year ago, the data we collected reflected that over 95% of all hotels and motels have smoke detectors in all the guest rooms. At least 45% of all guest rooms were also protected by sprinkler systems. Additionally, two-thirds of all high rise hotels, an area in which the sponsors of a similar bill in the 100th Congress seemed to express a particular interest, were fully protected with automatic sprinkler systems.

H.R. 94

As was mentioned previously, AH&MA is a voluntary trade association. The membership of AH&MA is quite diversified - both small and large, chain affiliated and independent, urban convention hotels, roadside motels and resorts, to name but a few.

Would all the properties in AH&MA's membership meet the guidelines as set out in H.R. 94? No. Many, however, may meet the guidelines or be exempt. Because it is impossible to properly represent all our AH&MA members and their very different situations relative to the proposed legislation, we have chosen to discuss only a few technical points in the bill.

A Federal Role?

First and foremost is the question of federal legislation in an area traditionally handled at the state and local level. Secondly, H.R. 94 does not propose minimum federal standards since the guidelines go beyond that contained in most building codes. Granted, H.R. 94 requires nothing of the lodging industry, unless of course you are reliant on, and perhaps were built (to code) because of the proximity of government business. There are even major chains with a corporate policy to install sprinkler systems which question the wisdom of federal legislation in this area.

Smoke Detectors

There seems to be uniform confusion on the subject of smoke detectors and the definition of system as used in the bill. On strict interpretation, few hotels and motels would meet the guidelines of H.R. 94. This is because a fully sprinklered property will have smoke detectors in the guest rooms but there are few that when sprinklered maintain smoke detector systems in the corridors, etc.

Implementation

The existing state and local statutes requiring retroactive installation of fire protection equipment in hotels have provided adequate time for such protection to be incorporated. In order for the industry to engage in retrofitting you must budget, the systems must be reviewed, and the installation must be planned. In effect, H.R. 94 allows 270 days from enactment - at any time after that you could be included or not in your state list of accommodations meeting the guidelines. This seems unreasonable.

The Goal

The goal of this legislation, we believe, is ensuring guest safety. It is a goal we share. We would encourage the sponsors and the Congress to consider ways to address some of the concerns expressed here so they do not become obstacles to reaching the goal...so they do not make smaller businesses feel that there is no way to reach the goal. We ask that you review the experience of the states and localities that have addressed these concerns.

Incentives/Disincentives

For example, if the act seeks to have sprinklers installed then it would seem a deterrent to simultaneously press for the overlapping smoke detection system requirement. Another example: the states requiring retroactive installation of fire protection equipment in hotels have allowed between 3 and 10 years to accomplish it. (See Nevada, Florida, Connecticut and Massachusetts statutes). Also, localities have taken care to not only provide incentives but to protect against disincentives. Such a large capital expenditure, as one might anticipate to meet the act's goal, could be met with opportunities for an investment tax credit. At a minimum, the cost of the system should not be included in the assessed value of the hotel for property tax purposes. (See California and New Jersey statutes). Finally, in some localities there are rather steep hook-up charges from the water utility and additional water charges for simply having a sprinkler system--not just when one is activated.

Many of these examples are issues decided on a state and local basis, and it brings to question once again whether a federal role is warranted.

Conclusion

The concerns and suggestions we have expressed here were passed to us from individuals and companies throughout the industry. Those that were most often repeated to us have been repeated to you. It is our hope that AH&MA can act as a conduit of information when it's appropriate. And that we can all work together to continue your efforts at raising America's consciousness about fire and fire protection.

HOLIDAY
CORPORATION

Richard T. Ashman
Vice President
Public Affairs

Holiday Corporation
1023 Cherry Road
Memphis, TN 38117 USA
901-762-8824

March 17, 1989

The Honorable Doug Walgren
Chairman
Subcommittee on Science, Research and Technology
2319 Rayburn House Office Building
Washington, D.C. 20515

Dear Mr. Chairman:

On behalf of Holiday Corporation, enclosed please find the testimony submitted for inclusion in the printed hearing record on H.R. 94, the Hotel and Motel Fire Safety Act of 1989.

I appreciate this opportunity to participate. If you have any questions or need additional information, please feel free to call on me.

Cordially,

Dick Ashman

Richard T. Ashman
Vice President
Public Affairs

Holiday Inns, Inc.
Harrah's
Embassy Suites, Inc.
Hampton Inns, Inc.

STATEMENT OF HOLIDAY CORPORATION

ON

H.R. 94 "HOTEL AND MOTEL FIRE SAFETY ACT OF 1989"

Holiday Corporation, which has over 357,000 rooms in over 1,860 hotels around the world (Holiday Inns, Embassy Suites, Hampton Inns, Horewood Suites) appreciates the opportunity to comment on H.R. 94, the Hotel and Motel Fire Safety Act of 1989.

Fire protection and safety in a hotel is a very complex issue...therefore not lending itself to any one simple fix or solution: for example, merely requiring smoke detectors and sprinklers in every guest room. Contributing significantly to guest safety are the materials used to construct and furnish a hotel.

Holiday Inns has for years taken a leadership position on the issue of fire protection safety of hotels and motels. From its first Holiday Inn hotel built in 1952, it required that all Holiday Inns be of fire proof (all masonry) construction...a first in the industry. Over the years we have added the requirement for fire proof and retardant fabrics and floorcoverings (including mattresses and drapes), fire rated walls and doors, and recently after exhaustive research and study, completed implemention of the newest requirement that all Holiday Inn hotels have hardwired automatic smoke detector alarm systems connected to a central annunciator panel at the front desk.

The dramatic hotel fires in recent years have highlighted the failure of a few facilities to provide a combination of adequate construction, furnishings, fixtures, systems and procedures necessary to safeguard their guests during fire emergencies. The lack of several of these key factors resulted in the loss of life during these fires. However, focus and emphasis of the media on the absence of automatic sprinklers in these fires has greatly distorted the issue and overshadowed the absence of fire proof building materials, fire proof and resistant furnishings, smoke and fire barriers, smoke detectors, proper exits and properly trained staff as means of protecting hotel guests during a fire. Automatic sprinkler protection is a valuable tool in fire protection but is not a total panacea to prevent loss of life in a hotel fire.

It is a well known fact that smoke detectors save lives. A 1988 study of fire protection in the lodging industry showed that 95 percent of all hotel rooms are equipped with smoke detectors.

The hotel industry in cooperation with suppliers of equipment and fixtures has made great strides in improving fire protection for its guests. These components have received extensive tests prior to installation. As an example, fire tests were conducted by the United States Fire Administration at the Factory Mutual Research Center using a mock hotel guest room equipped with typical hotel furnishings, sprinklers and smoke detectors. In a test simulating a smoldering cigarette dropped on a mattress of the room's bed, the first smoke detector alarmed 12 minutes after the test began. All detectors in the room had alarmed in 18 minutes. The first sprinkler in the room operated in 20 minutes.

A similar test simulating a fire in a wastebasket adjacent the guest room bed activated a smoke detector at 22 seconds. All detectors in this area alarmed within 60 seconds. The first sprinkler in the room operated at 2 minutes and 49 seconds. The value of automatic sprinklers is without argument in protecting hotel property. However, burn tests conducted to date have not provided conclusive evidence as to their value in protecting the life of a hotel guest.

Over 90 percent of our 1,393 Holiday Inn hotels in the United States are franchised and therefore owned and operated by independent business people. We believe it is unwarranted and excessive to require the additional investment of $450,000 to $700,000 to install a sprinkler system in such a hotel when they have had to comply with the construction and furnishing requirements cited above.

The lodging industry's goal is to reduce the number of hotel fires which will reduce the number of fire deaths. According to recent NFPA statistics, the number of fire deaths in the lodging industry is declining. This can only be attributed to increased protection. The fire protection survey conducted by the American Hotel and Motel Association and Tri Data shows fire protection in the lodging industry exceeded original estimates. This increase in protection can be attributed to state and local legislation as well as voluntary installation of equipment by the lodging industry.

Based on our exhaustive study, research, analysis and considerable experience in operating hotels for over 35 years, we strongly feel that federal regulation is unwarranted. The industry, the states and municipalities have and continue to act in a more than responsible manner with regard to the very complex and complicated issue of hotel fire safety.

**The Society of the
Plastics Industry, Inc.**

SPI

1275 K Street, N.W., Suite 400
Washington, D.C. 20005
(202) 371-5200

March 16, 1989

Chairman Doug Walgren
Science, Research and Technology Subcommittee
Committee on Science, Space and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Walgren:

The Society of the Plastics Industry, Inc. (SPI) is pleased to advise you of our support for HR 94, the "Hotel and Motel Fire Safety Act of 1989."

SPI is the major national trade association for the plastics industry, and is composed of over 2,000 members, representing approximately 75% of the dollar volume of the sales of plastics in the United States. SPI 's operating units and committees are composed of resin manufacturers, distributors, machinery manufacturers, plastics processors, moldmakers, and other industry-related companies and individuals. Founded in 1937, SPI serves as the "voice" of the plastics industry.

SPI has long been a champion of the use of detection and suppression devices to reduce the likelihood of personal injury and property damage from fire. For many years, SPI has supported research on the fire properties of plastics products and the development of fire protection engineering tools such as fire hazard analysis and fire risk assessment techniques.

SPI supported "Operation San Francisco" which was a major "real life" demonstration of the effectiveness of fire sprinklers in hotels and similar occupancies. Also, SPI was one of the founding members of "Operation Life Safety," a joint industry/fire service program to promote increase use of smoke detectors.

SPI, as a major trade association, holds over hundreds of meetings a year. Most are at airport or downtown hotels or resort facilities. SPI has found that facilities at preferred meeting locations which had the requisite meeting accommodations are frequently not fully sprinklered. Therefore, SPI fully supports the publication of the "National Master List" of facilities which comply with the guidelines for automatic smoke detectors and sprinkler systems. Such a list would be very helpful to meeting planners for the Society.

Further, SPI wholeheartedly endorses the dissemination to the maximum extent possible of information on the life safety value of detection and suppression systems. In fact, SPI developed and conducted a pilot public education program advocating the increased use of smoke detectors and sprinklers. Also, SPI contributed to the development of the booklet, "An Ounce of Prevention" published by the U.S. Fire Administration and has distributed it widely to its member companies for their further distribution.

Again, SPI has a long record of support of increased use of detection and suppression systems, and we support HR 94 because it would further such use. We are pleased to offer our views to the Subcommittee and look forward to providing any addtional information regarding the plastics industry's efforts in this area.

Sincerely,

Margaret Rogers
Director
Federal Government Affairs

D.E. SIEVERS & ASSOCIATES, LTD.

Fire Safety for the Hearing Impaired

March 23.1989

Honorable Douglas Walgren
United States Representative
Rayburn Building, Room 2241
Washington, D.C. 20515

Dear Mr. Walgren:

Our letter of March 17,1989, in response to requests by Ms. Molly George and Ms. Glenda Booth of your staff, stated that we would provide documentation disputing the contention by the American Hotel Motel Association and others that federal regulation of hotel/motel fire safety was unnecessary. We stated that the Amercan Hotel Motel Association contention that their "voluntarism" to safely and adequately protect the lives of deaf and hearing impaired guests would not be supported by the facts. We further stated that their opposition to state and local requirements for the life safety of their hearing impaired paying guests would be documented with their own testimony and written comment.

Enclosed please find eight (8) enclosures presented by American Hotel Motel Association representatives and affiliates to oppose adequate and effective fire safety for the deaf and hearing impaired. You will note that the Association went to the extent to petition the National Fire Protection Association (NFPA) to suspend and delete sections of an NFPA official document. The request was denied by NFPA. Both the request and denial are attached.

You will note that almost every conceivable form of opposition to state proposed regulation for the protection of the deaf, in the event of fire, has been submitted by AHMA representatives and affiliates. While this documentation centers around two states; much more documented opposition data is available.

Also enclosed please find AHMA requests to the State of Pennsylvania for an opportunity to provide testimony relative to any draft regulations, centering around specialized smoke detectors for the deaf and hearing impaired. In addition we are attaching our reply to the request for assistance by the Director, Pennsylvania Office of the Deaf and Hearing Impaired, Mr. Sandy Duncan.

You will note the attached tragic newspaper accounts of a large hotel fire that took the young lives of two deaf students and hospitalized an additional 36 deaf guests. We have located and interviewed two of the survivors, while legislation was being considered in another state. One desired to video tape the interview with both sign language and the assistance of an interpreter. That descriptive tape telling of his injuries and near death is available for your use. It is very noteworthy that the very same hotel, with 1565 rooms, as of this date, has only 25 rooms (1.5%) equipped with visual warning lights -- but only in the rooms for persons with physical disabilities. The warning lights provide an effective intensity (illumination) warning of .25 candela (less than 1

6309 Bradley Blvd. • Bethesda, MD 20817-3243 • Voice (301) 469-0278 • TDD (301) 469-0524

D.E. SIEVERS & ASSOCIATES, LTD.
Fire Safety for the Hearing Impaired

Honorable Douglas Walgren
March 23,1989
Page 2

candela); which is near the lowest measurable light output that Underwriters Laboratories can measure. The National Fire Protection Association criteria is considerably different, from the warning provided by the hotel.

We so very much hope and pray that you will decide to include the 8.77 % of our U.S. citizens that are deaf and hearing impaired in the fire protection you seek with the Hotel Motel Fire Safety Act. In reviewing the enclosures, you will see the opposition we face in state after state. We desperately need your help.

Very respectfully,

Donald E. Sievers
Fire Safety Consultant, National Association of the Deaf
DES:mo
Enclosures
cc: Mr. Lawrence Newman, President,National Association of the Deaf
Mr. Gary Olsen, Exec. Dir., National Association of the Deaf

6309 Bradley Blvd. • Bethesda, MD 20817-3243 • Voice (301) 469-0278 • TDD (301) 469-0524

American
Hotel &
Motel
Association

San Francisco '87
76th ANNUAL CONVENTION JUNE 21-24, 1987

888 SEVENTH AVENUE
NEW YORK, NY 10106
(212) 265-4506

Washington Office
1919 L Street, NW Suite 600
Washington DC 20036
(202) 223 6872

Educational Institute
1407 S. Harrison Road
East Lansing, Michigan 48823
(517) 353-5500

July 13, 1987

Mr. Arthur Cote, P.E.
Secretary
Standards Council
National Fire Protection Association
Batterymarch Park
Quincy, MASS 02269

VIA AIRBORNE

SUBJECT: REQUEST FOR TENTATIVE INTERIM AMENDMENT NFPA 72G-1985, GUIDE FOR NOTIFICATION APPLIANCES FOR PROTECTIVE SIGNALLING SYSTEMS

Dear Art:

In accordance with the provisions of Section 15 of the Regulations Governing Committee Projects, we are requesting a Tentative Interim Amendment be issued for the subject guide. Paragraphs affected are as indicated in our proposed TIA which is enclosed.

We cite as the "emergency nature requiring prompt attention" the pending adoption by the State of Florida, Division of State Fire Marshal of this Guide as a regulatory requirement despite NFPA's indication that this is a non-regulatory "Guide" as opposed to a Standard. This matter has been the subject of public hearings before the Hearing Officer for the Department of Insurance, Division of State Fire Marshal and is pending.

The confusion and difficulty in use of Section 3 and 5 of the guide have resulted in our attempts to clarify and simplify the language as indicated in the proposed TIA. Mr. Roy Harris of Sheraton Corporation, representing the American Hotel/Motel Association on the Committee on Protective Signalling Systems has indicated he will endorse this change as required by Section 15-1 of the Regulations Governing Committee Projects. Mr. Harris will be in contact with you directly.

Mr. Arthur Cote, P.E.
July 13, 1987
Page 2

Please advise of your determination in accordance to Section 15-2.

Sincerely,

Thomas Daly

Thomas G. Daly
Chairman
Committee on Safety and Fire Protection

Enclosure

cc: Ray Ellis
Roy Harris

bcc: Exec members/Comm. on S+F Prot.

AMERICAN HOTEL AND MOTEL ASSOCIATION

July 13, 1987

1. PROPOSED TENTATIVE INTERIM AMENDMENT

2. Guide for Installation, Maintenance and Testing of Notification Appliances for Protective Signalling Systems NFPA 72G--1985

3. Sections/Paragraphs: 3-2.1;3-2.1.1;3-2.1.2;3-2.4; 3-2.5;5-2.1;5-2.2

4. Delete text of all sections above.

   Revise as follows:

   a) Renumber existing 3-2.2 to 3-2.1
   b) Renumber existing 3-2.3 to 3-2.2
   c) Add new "3-2.3 Appliance Photometrics" as follows:

   > "The visible signal~~l~~ing appliance should have an effective light intensity greater than the ambient light conditions in the room or space."

   d) Add new paragraph under "Definitions" (Sec. 2-2.3)

   > "Ambient light conditions shall be the expected light intensity under normal occupancy considerations. Light intensity shall include both natural light and artificial light sources."

   e) Add new "5-2 Number, Spacing and Location Requirements" as follows:

   > "5-2.1 Number and Spacing of Visible Appliances
   > A minimum of one appliance per area. Where required dwelling units should have one for each sleeping room and one for each living area. One additional appliance for each 7500 sq. ft. (697 sq m) of nonresidential floor area in excess of 10,000 sq. ft. (929 sq m), with a maximum separation distance of 200 ft. (60 m)." A minimum of one appliance is recommended in the concentrated viewing path such as might be expected in classrooms, theatre stages, etc.

5-2.2 Location of Visible Signalling Appliances

5-2.2.1 When on walls, a minimum of 80 in. (2 m) above the floor surface or 6 in. (0.15 m) below the ceiling.

5-2.2.2 When on ceilings, not less than 6 ins. (0.15 m) from any wall/ceiling intersection.

5-2.2.3 Supplementary visible signalling appliances may be located less than 80 in. (2 m) above the floor."

5. Statement of problem and substantiation for Tentative Interim Amendment.

The existing language presents design, installation and enforcement problems based on an exceedingly complicated set of criteria. There is no fire record to indicate any injuries or fatalities to building occupants where currently available listed visible signalling appliances have been provided for fire warning purposes.

The proposed language will provide adequate notice to persons occupying high noise areas or to those who suffer hearing impairment or deafness.

The proposed language will simplify design, installation and enforcement while meeting the intent of the Guide.

file: tia.72g

Committee on
Protective Signaling Systems
of the NATIONAL FIRE PROTECTION ASSOCIATION
BATTERYMARCH PARK, QUINCY, MASSACHUSETTS 02269 — TELEPHONE (617) 328-9290 TELEX 94-0720

Reply To:

March 3, 1988

Donald Sievers
D E Sievers & Associates LTD
6309 Bradley Blvd
Bethesda MD 20817-3243

Dear Don:

Enclosed is the material you requested for TIA No. 237, NFPA 72G.

I have also enclosed the ballot results of the Technical Committee, and the decision of the Standards Council regarding this issue.

If I can be of further assistance, please feel free to contact me.

Sincerely,

Richard P. Bielen

Richard P. Bielen
Fire Protection Engineer

RPB/cc
Enclosure

— NOTICE ON INTERPRETATIONS —
A statement, written or oral, that is not processed in accordance with Section 16 of the Regulations Governing Committee Projects shall not be considered the official position of NFPA or any of its Committees and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

FEB 11 REC'D

NFPA
"Moving Mankind Toward Safety From Fire"

NATIONAL
FIRE PROTECTION
ASSOCIATION
INTERNATIONAL

ARTHUR E. COTE, Assistant Vice President — Standards

February 10, 1988

Mr. Thomas G. Daly
American Hotel & Motel Association
c/o Hilton Hotels Corporation
9336 Santa Monica Boulevard
Beverly Hills, CA 90210

Dear Tom:

This is to advise you that at its meeting on January 11-13, 1988, the Standards Council voted to not issue the proposed Tentative Interim Amendment to Chapters 3 and 5 of NFPA 72G-1985, Notification Appliances for Protective Signaling Systems. This was because the Council felt that it lacked evidence that it is of an emergency nature requiring prompt action and it did not receive the support of the Committee.

Very truly yours,

Arthur E. Cote, P.E.
Secretary, Standards Council

AEC/ams

cc: R. Bielen
I. Manoe
P. Phillips
J. Bryan
L. A. Nisbet

SC 88-4

(TIA No. 237)

Winegardner & Hammons, Inc.
4243 Hunt Road
Cincinnati Ohio 45242
513 891 1066

June 16, 1987

Mr. Stephen Fredrickson, Esq.
Department of Inspection
Legal Department
Tallahassee, FL 32301

RE: Direct Signalling Appliances for the Hearing Impaired

Dear Mr. Fredrickson:

It has been brought to my attention that the State of Florida is giving consideration to requiring a minimum 100 candela light intensity for all fire warning visual signalling appliances for the hearing impaired.

As a fire protection specialist with fifteen years experience who is responsible for over 40 hotels coast to coast, a member of the Industrial Section of the National Fire Protection Association, and a member of the American Hotel/Motel Association Safety and Fire Protection Committee, I can state without reservation that 100 candela is excessive regarding direct signalling appliances. Tests have concluded that intensity levels below 10 candela can be easily seen under normal lighting conditions.

My reason for involvement in this matter is to insure that a performance standard is adopted that will fulfill the need, nothing more.

Another point to consider is that NFPA Standard 72-G will more than likely be re-written to reduce the minimum requirement under a "worst case scenario" for building interiors from 100 candela to 15-150 candela.

Thank you for your consideration in this matter.

Sincerely,

WINEGARDNER & HAMMONS, INC.

Robert Sears
Robert Sears
Director of Life/Safety

WRS/klf

cc: D. R. DeWar
Office of the State Fire Marshall
State of Florida
Larson Building
Tallahassee, FL 32304

Chrono/Desk

American
Hotel &
Motel
Association

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East Lansing Michigan 48823
(517) 353-5500

San Francisco '87
76th ANNUAL CONVENTION JUNE 21-24, 1987

June 15, 1987

VIA AIRBORNE

Mr. Stephen Frederickson, Esq.
Hearing Officer
Department of Insurance
Legal Division
Larsen Building
Tallahasse, Fla. 32301

SUBJECT: RULES OF THE DEPARTMENT OF INSURANCE DIVISION OF STATE FIRE MARSHAL/ CHAPTER 4A-4309, AUTOMATIC SMOKE DETECTION REQUIREMENTS

Dear Mr. Frederickson:

The American Hotel and Motel Association's member hotels and corporations represent, through the Florida Hotel and Motel Association, a substantial number of lodging establishments within the State of Florida. As such, our members are substantially affected by the rules of the State Fire Marshal, which have implemented the Florida Hotel/Motel Time Share Fire Safety Law.

In an attempt to meet requirements of the law (Chapter 509.215(8)), many of our member hotels have installed specialized smoke detectors for the deaf and hearing impaired. In doing so, they have utilized devices incorporating a strobe light which we believe to be the correct warning signal, although such is not specified in the statute or in the rules implementing the statute. Further, the rules make no reference to specific standards of the National Fire Protection Association (NFPA) relative to these devices. Our members have moved, in a good faith effort, to comply with the law lacking further guidance from the State.

We believe that a current petition to incorporate into the State Fire Marshal's Rules the provisions of the National Fire Protection Association's Guide for the Installation, Maintenance and Use of Notification Appliances for Protective Signalling Systems (NFPA 72G-1985), specifically Section 3-2.3, is inappropriate for several reasons. First, a Guide as defined by NFPA (NFPA 1M Manual of Style for NFPA Technical Committee Documents) is a "Document[s] that is [are] informative in nature and do not contain requirements (emphasis added) or recommendations." See enclosure 1.

As such, the adoption of this Guide as a regulatory requirement per the petitioner's request, is in direct conflict with the intent of the NFPA document.

Second, in discussions with the members of the NFPA Committee on Protective Signalling Systems regarding this Guide, there is substantial concern that the technical basis for the adoption of the requirements of Section 3-2.3 were substantially overstated based on the levels of light pulse characteristics necessary to alert a hearing impaired guest in a quiescent setting such as a hotel room. This matter is now receiving extensive review by the Committee and proposals are being made by the public to modify these requirements. The Committee will study this issue during the summer of 1987 and will have recommendations to the NFPA for adoption at the November, 1988 meeting. Therefore, it seems premature to adopt or consider adopting requirements which may have an imprecise technical basis and which may be subject to change in the immediate future.

Third, the light characteristics specified in the NFPA document have been reviewed against the devices and equipment available in the marketplace. It is our understanding that only a single manufacturer produces this equipment. As such, it presents a competitive disadvantage and a potential for a monopolistic marketplace condition to the detriment of our industry.

Fourth, we refer you to the Rules, Section 4A-43.06 (4) which states,

> "any components installed and operational on the effective date of this rule chapter, may continue to be used regardless of the requirements of the NFPA Standards adopted in (3), above, if those components are performing or can be made to perform to the satisfaction of the authority having jurisdiction."

We believe that the devices utilized by our member lodging establishments do represent a reasonable and prudent application of the device required to alert the hearing impaired save any specific regulations by the State of Florida. A such, we do not believe that any existing installation should be penalized by further regulations when the State has not opted to provide guidance prior to the effective date (October 1986) of the rule chapter.

Fifth, we refer you to the Rule 4A-43.02 "Purpose" which states,

> "these rules try to avoid requirements which might result in unreasonable hardship, or unnecessary inconvenience or interference with the normal use and occupancy of a building".

We believe that any further attempt by the State to adopt the requirements which are of questionable technical substance is not in accordance with the purpose of the rules and would cause an unreasonable hardship to our members.

We do intend to pursue, with the NFPA, further clarifications of the Guide, NFPA 72G and would recommend to the State of Florida, holding in abeyance any potential regulation regarding this issue, until such time as the technical matters have been satisfactorily resolved.

Cordially,

Thomas G. Daly
Chairman
Committee on Safety and Fire Protection
American Hotel and Motel Association

cc: Thomas Waits
Buddy Dewar

TGD/gad

STATE OF CALIFORNIA

-0-0-0-

BEFORE THE STATE BUILDING STANDARDS COMMISSION

SUPPLEMENT TO STATEMENT OF POSITION OF THE CALIFORNIA HOTEL & MOTEL ASSOCIATION REGARDING THE JOINT ADOPTION PROCEEDING PERTAINING TO PARTS 2, 6, AND 12 OF THE 1988 UNIFORM BUILDING CODE

(BSC 4/87)

EDWIN F. SLOAN
California Hotel & Motel
Association
414 - 29th Street
Sacramento, California 95816
916/444-5780

JAMES O. ABRAMS
Jackson & Abrams
650 California Street
Suite 2210
San Francisco, CA 94108
415/981-4600
Attorneys for the California
Hotel & Motel Association

July 19, 1988

RECEIVED
JUL 19 1988
Building Standards Commissio..

The California Hotel & Motel Association ("Association") filed on July 13, 1988 a Statement of Position in this proceeding. In that Statement of Position, the Association commented on, among other things, various regulations proposed by the State Fire Marshal.

One of the proposed State Fire Marshal regulations as to which the Association has strong objections in several respects is Section 1210(a)5.1, which would require the installation of approved and listed visual warning devices activated by smoke detectors within hotel and motel guestrooms. In its previous Statement of Position, the Association inadvertently failed to point out the fact that the second paragraph of this particular proposed regulation would impose a requirement which in fact is not a building standard. In particular, the second paragraph of the proposed regulation would require that a specified number of "approved and listed portable visual warning devices activated by smoke detectors" be available for guests who "wish to utilize suites or sleeping rooms which are not provided with a permanently installed visual warning device." (Emphasis added.)

The term "building standard" is defined in Health and Safety Code Section 18909. Section 18909(a) makes it clear that a building standard pertains to the regulation of the method of use, properties, performance, or types of materials "used in the construction, alteration, improvement, repair, or rehabilitation" of buildings and structures. It is obvious that a requirement that a specified number of portable visual warning devices be made available in hotels and motels does not constitute a building standard. Such a requirement is no different, for example, than requirements that a hotel or motel provide clean linen or sanitized drinking glasses.

For this additional reason, the Association objects to the second paragraph of proposed Section 1210(a)5.1.

The foregoing shall be deemed to be a supplement to the Statement of Position previously filed by the Association, and it should not be deemed to be in lieu of or in derogation of any objection or comment made in that Statement of Position.

Respectfully submitted,
CALIFORNIA HOTEL & MOTEL
ASSOCIATION

By ______________________
Edwin F. Sloan
Executive Vice President

COPY

BEFORE THE

STATE OF CALIFORNIA

BUILDING STANDARDS COMMISSION

IN THE MATTER OF:)
)
STATE BUILDING CODE)
PARTS 2, 6 AND 12, TITLE 24)
)

DATE AND TIME: MONDAY, JUNE 13, 1988, 10:00 A.M.

PLACE: CITY COUNCIL CHAMBERS
17200 JAMBOREE
IRVINE, CALIFORNIA

REPORTER: BETH C. DRAIN, CSR
CERTIFICATE NO. 7152

RECEIVED
JUL 28 1988
Building Standards Commission

barristers'
reporting service
1600 EAST FOURTH STREET, SUITE 220
SANTA ANA, CALIFORNIA 92701
TELEPHONE (714) 953-4447

WE DON'T HAVE ALL THE REPRESENTATIVES HERE, BUT WE DO START AT 10 O'CLOCK. SO I THINK WE'RE GOING TO GO AHEAD AND PROCEED. I THINK WE'RE GOING TO START WITH RANDY, THE STATE FIRE MARSHAL'S OFFICE. SO IF THERE'S ANYONE WHO HAS ANYTHING THAT THEY'D LIKE TO SAY, PLEASE STEP FORWARD.

MR. DAILEY: THANK YOU, MADAM CHAIRMAN. FOR THE RECORD, MY NAME IS THOMAS DAILEY. I'M DIRECTOR OF LIFE SAFETY FOR HILTON HOTELS CORPORATION. HILTON HOTELS CORPORATION IS HEADQUARTERED IN BEVERLY HILLS, CALIFORNIA, AND OPERATES 27 HOTELS, ACCOUNTING FOR MORE THAN 12,000 ROOMS IN THIS STATE, AND INTENDS TO UPGRADE SEVERAL DOZEN MORE IN THE COMING YEARS.

AS SUCH, WE ARE SUBSTANTIALLY AFFECTED BY THE PROPOSALS PRESENTED FOR OUR COMMENT TODAY. MY COMMENTS WILL BE LIMITED TO PROPOSALS OF THE STATE FIRE MARSHAL'S OFFICE, BUT WE ALSO ENDORSE THE PROPOSALS OF THE COMMENTS TO BE MADE LATER THIS MORNING BY REPRESENTATIVES OF THE CALIFORNIA HOTEL AND MOTEL ASSOCIATION.

FIRST COMMENT IS IN RELATION TO SECTION 1202(B), EXCEPTION 1 IN THE PROPOSED ADOPTION PACKAGE. WE BELIEVE THAT THE REQUIREMENT FOR ONE-HOUR FIRE RESISTANT CONSTRUCTION, WHICH HAS TRADITIONALLY BEEN IN THE CODE, SHOULD BE REDUCED TO 30-MINUTE FIRE RESISTANT CONSTRUCTION. THE RATIONALE IS THAT PRIOR TO THIS TIME

HOTEL GUEST ROOMS HAVE BEEN NOT REQUIRED TO BE SPRINKLERED.

THE STATE FIRE MARSHAL IS NOW REQUIRING THAT HOTELS GREATER THAN TWO STORIES IN HEIGHT BE PROTECTED THROUGHOUT BY SPRINKLERS. WHERE OTHER BUILDING CODES AND OTHER NATIONAL CONSENSUS STANDARDS HAVE SEEN THIS TYPE OF CHANGE, THE CODE REQUIREMENT HAS BEEN REDUCED. THIS APPEARS IN BOTH THE NATIONAL BUILDING CODE AS WELL AS IN THE NAPF LIFE SAFETY CODE.

SECOND COMMENT DEALS WITH SECTION 1210(A), 5.1, WHICH IS A NEW SECTION BEING PROPOSED, AND IT IS NOT CURRENTLY IN THE UNIFORM BUILDING CODE. WE BELIEVE THAT THIS INVOLVES THE SMOKE DETECTORS FOR THE HEARING IMPAIRED. WE SUPPORT THIS CONCEPT AND, AS A MATTER OF COURSE, HAVE BEEN INSTALLING SUCH UNITS IN HILTON HOTELS IN THIS STATE FOR MORE THAN FIVE YEARS. THE STATE IS NOT ACTING FOR THE FIRST TIME IN THIS REGARD.

IN ADDITION TO MY WRITTEN COMMENTS, I WOULD LIKE TO SAY THAT FOR THOSE HOTEL COMPANIES AND OPERATORS WHO HAVE INSTALLED EQUIPMENT TO DATE, WE BELIEVE THAT THIS NEW REQUIREMENT WILL IN SOME INSTANCES PENALIZE THOSE WHO HAVE MOVED FORWARD IN A GOOD FAITH EFFORT TO PROVIDE THIS PROTECTION TO THE HEARING IMPAIRED.

THE NUMBER OF DETECTORS BEING REQUIRED IN THAT PROPOSED SECTION IS FAR IN EXCESS OF THE DEMAND THAT WE

HAVE SEEN OR THAT THE AMERICAN HOTEL AND MOTEL ASSOCIATION IN CONDUCTING A STUDY HAS SEEN IN TWO OTHER STATES AND TWO MAJOR CITIES WHERE A SIMILAR REQUIREMENT HAS BEEN IN PLACE FOR MORE THAN A YEAR.

WE ALSO BELIEVE THAT THE TEXT OF THE SECTION WHICH REQUIRES CONFORMANCE TO ANSI UL STANDARD 1638 IS INCORRECTLY STATED AS A PERFORMANCE STANDARD WHEN, IN FACT, THIS IS ONLY A TEST METHOD. WE BELIEVE THAT THE CORRECT REFERENCE STANDARD IS NFPA 72(G) AND WOULD RECOMMEND THE ADOPTION OF THOSE REQUIREMENTS.

WE ALSO BELIEVE THAT AN ADDITIONAL REQUIREMENT IN THIS SECTION THAT AN EQUAL NUMBER OF APPROVED AND LISTED PORTABLE VISUAL WARNING DEVICES IS UNWARRANTED. A PORTABLE DEVICE DOES NOT PROVIDE THE SAME DEGREE OF SAFETY TO THE HEARING IMPAIRED GUEST AS ONE WHICH IS PERMANENTLY INSTALLED AND SHOULD NOT BE REQUIRED.

LASTLY, WE BELIEVE THAT THE LETTERING ON THE SIGN REQUIRED IN THIS SECTION IS SUBSTANTIALLY LARGER THAN NEED BE AND SUBSTANTIALLY LARGER THAN OTHER WARNING SIGNS REQUIRED BY THE STATE, FOR EXAMPLE THOSE WITHIN ELEVATORS.

THIRD COMMENT DEALS WITH SECTION 1716.2 AND, AGAIN, IS A REFERENCE TO MY FIRST COMMENT RELATIVE TO FIRE RESISTANT SUBDIVISIONS. AGAIN, WE ARE NOW CHANGING THE RULES TO REQUIRE HOTEL/MOTEL ROOMS TO BE SPRINKLERED

DETERMINED.

PERSONS RESPONDING TO A SINGLE-VOICE MESSAGE MAY INADVERTENTLY ENTER AN AREA OF DANGER AS HAS BEEN EXPERIENCED OTHER JURISDICTIONS WHO HAVE ATTEMPTED TO UTILIZE THE AUTOMATIC MESSAGE CAPABILITY. THE NATIONAL CONSENSUS STANDARD FOR THIS ISSUE, AGAIN, IS NFPA 72(F) 1985. THEY HAVE PREVIOUSLY REVIEWED AND REJECTED THE USE OF AUTOMATIC RECORDED MESSAGES, AND THAT BACKUP REFERENCE MATERIAL IS INCLUDED IN OUR STATEMENT FOR THE FIRE MARSHAL'S REVIEW.

THANK YOU VERY MUCH, MADAM CHAIRMAN.

CHAIRWOMAN SUDDERBERG: THANK YOU, MR. DAILEY. ANYONE ELSE WITH SOME COMMENTS FOR THE FIRE MARSHAL?

MR. ABRAMS: MADAM CHAIRMAN, MY NAME IS JIM ABRAMS, AND I REPRESENT THE CALIFORNIA HOTEL AND MOTEL ASSOCIATION.

FIRST OF ALL, I WOULD LIKE TO STATE THAT THE ASSOCIATION RATIFIES AND ACCEPTS THE COMMENTS THAT WERE JUST MADE BY MR. DAILEY ON BEHALF OF HILTON HOTELS CORPORATION.

THE CALIFORNIA HOTEL AND MOTEL ASSOCIATION HAS APPROXIMATELY 1100 MEMBER PROPERTIES WHICH REPRESENT OVER 170,000 GUEST ROOMS IN THE STATE OF CALIFORNIA, INVOLVING ALL TYPES OF LODGING ESTABLISHMENTS FROM BED AND BREAKFAST ESTABLISHMENTS TO 2000 ROOM CONVENTION

PROPERTIES.

WE ARE SUBMITTING AND HAVE PREVIOUSLY GIVEN TO THE STATE FIRE MARSHAL'S OFFICE WRITTEN COMMENTS. I WOULD LIKE TO HIGHLIGHT TWO POINTS. FIRST OF ALL, WITH RESPECT TO SECTION 121085, WHICH REQUIRES THE INSTALLATION OF VISUAL WARNING DEVICES FOR HEARING IMPAIRED INDIVIDUALS, AGAIN, THE CALIFORNIA HOTEL AND MOTEL ASSOCIATION, AS DOES HILTON HOTELS CORPORATION, SUPPORTS THIS CONCEPT; HOWEVER, WE FEEL THAT THERE ARE SOME PROBLEMS IN THE PROPOSAL.

FIRST OF ALL, I WOULD LIKE TO POINT OUT THAT THE PROPOSAL WOULD REQUIRE THAT THE DEVICES BE PLACED IN ROOMS THAT ARE NOT SPECIFICALLY MADE ACCESSIBLE TO HANDICAPPED INDIVIDUALS UNDER SECTION 1214 OF THE CODE, WHICH ARE THE VERY LARGE ROOMS.

A NUMBER OF HOTEL COMPANIES HAVE VOLUNTARILY INSTALLED VISUAL WARNING DEVICES IN THOSE ROOMS, AND WE FEEL THAT IT WOULD BE INEQUITABLE TO TEAR OUT THOSE DEVICES OR DOUBLE UP THE NUMBER. AND WHAT WE WOULD PROPOSE IS, AS STATED IN OUR POSITION PAPER, IS THAT HOTELS THAT HAVE ALREADY INSTALLED VISUAL WARNING DEVICES, IF THEY HAPPEN TO BE IN THE ROOMS THAT ARE REQUIRED TO BE ACCESSIBLE UNDER SECTION 1214, THAT IN EXISTING PROPERTIES THAT STATUS QUO BE ALLOWED TO CONTINUE AND THAT THE REQUIREMENT ONLY APPLY TO NEW

CONSTRUCTION OR NEW INSTALLATION OF DEVICES IN THE EXISTING BUILDINGS.

WE ALSO ARE VERY CONCERNED ABOUT THE PROPOSED REQUIREMENT FOR DOUBLING UP THE NUMBER BY USING PORTABLE DEVICES. WE ARE ALSO CONCERNED ABOUT THE SAFETY FACTOR; AND WE, TOO, FEEL THAT THE NUMBER OF DEVICES IS TOTALLY OUT OF LINE IN TERMS OF WHAT IS REQUIRED IN OTHER JURISDICTIONS, IN FACT, WHAT THE PUBLIC NEEDS. AND WE WOULD LIKE TO PROPOSE TO THE STATE FIRE MARSHAL'S OFFICE AND STATE -- THIS IN OUR POSITION PAPER -- THAT THE REGULATION BE AMENDED TO PROVIDE FOR THE NUMBER OF PERMANENTLY INSTALLED DEVICES THAT ARE CONTEMPLATED WITH NO REQUIREMENT FOR PORTABLE DEVICES, BUT THERE BE A SURVEY OR A STUDY OF SOME SORT IN THE HOTEL ASSOCIATION. WE'D BE HAPPY TO COOPERATE WITH THE STATE FIRE MARSHAL'S OFFICE OVER THE NEXT SIX MONTHS OR NEXT YEAR, WHATEVER PERIOD OF TIME IS DEEMED APPROPRIATE, TO DETERMINE EXACTLY WHAT THE NEED IS IN TERMS OF NUMBERS OF DEVICES BECAUSE THEN PEOPLE CAN INSTALL THEM ON A REALISTIC BASIS INSTEAD OF EVERYONE TRYING TO GUESS. WE ALSO SUPPORT THE IDEA OF REFERENCING THE NFPA STANDARD 72(G) 1985 AS THE PERFORMANCE CRITERIA FOR THE DEVICES THEMSELVES.

AND, LASTLY, WE WOULD ALSO POINT OUT THAT WE FEEL, TOO, THAT THE STATUTE THAT GAVE RISE TO SECTION 3314(E) AND (F) DID NOT AUTHORIZE, DOES NOT REQUIRE, IN

RECEIVED
JUL 13 1988
Building Standards Commission

STATE OF CALIFORNIA

-0-0-0-

BEFORE THE STATE BUILDING STANDARDS COMMISSION

STATEMENT OF POSITION OF THE CALIFORNIA HOTEL & MOTEL ASSOCIATION REGARDING THE JOINT ADOPTION PROCEEDING PERTAINING TO PARTS 2, 6, AND 12 OF THE 1988 UNIFORM BUILDING CODE

(BSC 4/87)

EDWIN F. SLOAN
California Hotel & Motel
 Association
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916/444-5780

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Jackson & Abrams
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415/981-4600
Attorneys for California Hotel
 & Motel Association

July 13, 1988

L. Sections 3315(b)(2) and (3)

The Association objects to the adoption of Sections 3315(b)(2) and (3) of the Uniform Building Code to the extent that these provisions conflict in any manner whatsoever with the provisions of Health and Safety Code Section 19952.

M. Sections 7203 and 7204

These sections would be amended by the State Architect to set forth detailed technical requirements and operating characteristics of signaling devices intended to alert hearing impaired individuals. Moreover, the proposed amendments would require that they be installed in hotel and motel guestrooms. **It is extremely important that the State Building Standards Commission understand that the technical requirements proposed by the State Architect are unsound, unwarranted, and extremely unsafe.**

In particular, the State Architect would require that all such devices have an intensity of not less that 100 candela. **It appears that only one device currently meets that standard and that device is manufactured by the company that manufacturers strobe lights that are affixed to the ends of the wings on jet aircraft!** The Association is informed that other states that are considering this particular issue have concluded that this is, at best, an extremely troublesome standard.

It is also extremely important to note that Health and Safety Code Section 18930(a)(9) provides that a building standard, "if intended to promote fire and panic safety, has the written approval of the State Fire Marshall." The Association has discussed this matter with the State Fire Marshall's staff and the Association is informed that the State Fire Marshall has disapproved the State Architect's provisions.

It cannot be emphasized too much that this is an extremely sensitive and important area that involves the physical safety and well-being of hotel guests. While it is laudable that the State Architect is concerned about this matter, it is critical that the State Architect await the studied conclusions of the state agency (the office of the State Fire Marshall) which has been delegated by the Legislature the responsibility of dealing with such matters.

III. PROPOSED REGULATIONS OF DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

The Statement of Reasons for Regulatory Action pertaining to the Department of Housing and Community Development indicates the following: "The Department has

IV. PROPOSED REGULATIONS OF STATE FIRE MARSHAL

In addition to the comments, questions, and objections noted below, the Association understands that Hilton Hotels Corporation will be filing a Statement in this proceeding. The Association agrees with and endorses the comments contained in that Statement.

A. Section 1210(a)5.1

By way of this new section, the State Fire Marshal would require the installation of approved and listed visual warning devices activated by smoke detectors within guestrooms in hotels and motels. The Association has several objections and suggestions with respect to this proposed regulation.

First, the Association wishes to make it clear that it does not object to the number of detectors that would be required by virtue of the first paragraph of this particular section. However, this particular paragraph specifies that the visual warning devices in question must be placed in rooms other than those rooms which are required to be accessible to physically disabled persons by virtue of (new) Section 1214.1. While the Association has no problem with such a requirement as it relates to new construction, the Association wants to point out that several hotel companies have voluntarily undertaken the installation of visual warning devices in existing hotels and motels in California. In many instances, those devices have been installed in the rooms that are required to be accessible to physically disabled persons pursuant to Section 1214.1. The voluntary installation of these visual warning devices in existing properties has involved the expenditure of substantial sums of money, and it is submitted that it would be an undue hardship and create an inequitable burden if those properties which have already undertaken the task of making their hotels and motels safer should have to now provide double the number specified in the proposed regulation. For these reasons, the Association submits that this particular regulation should be amended to provide that the visual warning devices are to be installed in rooms other than the "accessible" rooms of a hotel or motel in the case of new construction, but that where a hotel or motel has already installed visual warning devices in the "accessible" guestrooms in an existing property, those devices will be deemed to meet the requirements of this section.

Second, the second paragraph of this proposed regulation would require that an equal number of portable visual warning devices be made available for guests who wish to use guestrooms which are not provided with a permanently installed device. The Association is very much concerned about this requirement for a number of reasons. To begin with, this requirement for double the number of devices specified in the first paragraph of this section would require innkeepers to provide many more visual warning devices than are needed. Surveys conducted by the American Hotel & Motel Association in Florida, New York, and in the City of Chicago have indicated that very few requests for visual warning devices are received by innkeepers, and it is obvious that the substantial cost of providing such devices should not have to be borne by innkeepers if it is not anticipated that the additional devices will be used. Moreover, the number of devices that would be required under the State Fire Marshal's proposed regulation are far in excess of those required in other states. For example, in Virginia visual warning devices need not exceed one per cent (there is no requirement for hotels or motels with fewer than 50 units); Maryland requires two per cent; Ohio requires one for each 75 rooms; Connecticut requires one per cent; the State of New York requires three per cent (the New York requirement applies only to hotels and motels three or more stories in height or with 30 or more sleeping rooms); Washington, D.C. requires two per cent; the State of Florida requires two per cent, but not more than five per property; Texas requires one unit for each 60 rooms, but not more than five. Therefore, it is obvious that the number of devices proposed by the State Fire Marshal is far in excess of those required by almost all of the other jurisdictions which require visual warning devices, and the number is very much in excess of the number of requests received by the lodging industry for such devices.

Equally important, the Association is concerned with the use of portable devices at all. These devices typically need to be installed in a very careful manner, and there is a possible risk that hotel guests, or even hotel employees, will not always install the devices as required by the manufacturer. Among other things, this obvious creates a substantial risk of liability on the part of the innkeeper.

For these reasons, the Association respectfully submits that it is premature to require an equal number of portable devices over and above the permanently installed devices referred to in the first paragraph of the proposed regulation. The Association suggests that the appropriate manner in which to address this problem is to require the number of permanently installed devices specified in the first paragraph of the proposed regulation and to have the State Fire Marshal and the California lodging industry conduct a joint study over a reasonable period of time to determine to what extent, if any, there is actually a need for additional devices. The Association would be more than happy to work with the State Fire Marshal's office in the conducting of such a survey. That type of survey would provide definite information that the State Fire Marshal could act upon in determining exactly how many devices should be required in hotels and motels.

Third, the third paragraph of the proposed regulation would require that the visual warning devices have "an effective intensity of not less than 100 candela as listed and labeled in accordance with ANSI/Underwriters' Laboratory, Inc., Standard 1638." It is important to note that the ANSI Standard 1638 is not a performance criteria, it is merely a test standard. The exact intensity which visual warning devices must produce is in fact the subject of the Guide for Installation, Maintenance and Use of Notification Appliances for Protective Signaling Systems, NFPA 72G - 1985. This particular standard is recognized by the fire services, as well as building owners and managers throughout the country, and, its adoption in California in connection with visual warning devices would be consistent with the requirement that the State Fire Marshal adopt and utilize existing uniform, model codes and standards whenever possible. Therefore, the Association recommends that the third paragraph of the proposed regulation be amended to read as follows:

> "Portable and permanently installed visual warning devices shall have an effective intensity as set forth in the Guide for Installation, Maintenance and Use of Notification Appliances for Protective Signaling Systems, NFPA 72G - 1985. Such devices shall be installed in accordance with the State Fire Marshal listing."

Fourth, the fourth paragraph of the proposed regulation would require that innkeepers provide signs at the front desk notifying guests of the availability of visual warning devices. This particular provision would require, among other things, that the lettering on the sign be at least one-inch in height. One-inch lettering will result in an extremely large sign. Not only will this be an onerous burden to innkeepers, who are or will be under obligations to provide warnings in many instances under such laws as the Safe Drinking Water and Toxic Enforcement Act of 1986 and under the State Fire Marshal's proposed amendments to Title 19, California Code of Regulations, Section 3.09, the size of lettering is far in excess of that required in other portions of the State Building Code. For example, Section 5103(g)4 requires that signs in elevators advising as to steps to be taken in the event of an emergency need not have lettering larger than 3/16th inch in height.

Fifth, the proposed regulation does not make it clear exactly what criteria a "permanently installed" visual warning device must meet. This should be clarified.

Sixth, the final paragraph in the proposed regulation states that existing hotels, motels, and lodging houses must comply with the regulation within six months. Based on experience which various hotel companies have already had in installing visual warning devices in existing properties, it is quite clear that the six-month period will be far too short to permit installation of the required devices. This will be particularly true if permanently installed devices are wired into the building's fire alarm system. The Association submits that a one-year period will be long enough to permit the industry to comply with this particular regulation, and it is felt that this short extension would not create any undue hardship to guests of lodging establishments.

B. Section 1807(e)1

This particular section is proposed to be amended to provide that: "Upon activation of the automatic sprinkler system, any automatic fire-detection device required by this section or any special hazard fire protection or extinguishing system, an automatic voice alarm signal shall sound on the floor where activated . . . ." (Emphasis added.) This issue was discussed previously before the State Building Standards Commission, and the Association objected strongly to any requirement that there be an automatic voice alarm device in buildings. The Association is aware of circumstances where tragedies have occurred due to the fact that automatic voice alarms have been utilized. In part, the problem results from the fact that there is no way to program a voice alarm system to deal with all situations that can arise. Building operators who place a false sense of security in such devices often fail, therefore, to take steps that are appropriate to each emergency situation. The National Fire Protection Association has concluded that recorded voice alarms are not appropriate. For these reasons, the Association respectfully requests that the State Fire Marshal and State Building Standards Commission reexamine this issue.

D. Section 3304

Although no change is proposed in the first paragraph of Section 3304(b), the Association wishes to point out that the requirement that door latches must release when subjected to a 15-pound force is unrealistic. This force is often exceeded by the pressure exerted by wind, and, therefore, it can cause significant problems. It is respectfully submitted that the State Fire Marshal and the State Building Standards Commission should reexamine this issue.

E. Section 3314(f)

Pursuant to Health and Safety Code Sections 13143(a) and 17920.8, which were amended and added, respectively, in 1987, the State Fire Marshal is required to develop regulations for the installation in new buildings of "distinctive devices, signs, or other means that identify exits and can be felt or seen near the floor." In response to this legislation, the State Fire Marshal is proposing in this rulemaking proceeding the adoption of Sections 3314(e) and (f). Section 3314(e) would appear to be generally appropriate under the above-referenced legislation (although it provides for signs that can be both seen and felt, whereas the legislation talks in the disjunctive).

However, the requirement in proposed Section 3314(f) is far in excess of the legislative mandate and is extremely onerous. This particular provision would require that all paths along exit corridors must be equipped with specified low-level signage. Aside from the fact that the legislation does not impose such a requirement, no such requirement appears in NFPA's requirements or, as far as the Association is aware, in any other recognized entity's standards.

Not only will the installation of all of these corridor devices be extremely expensive and unsightly, they will require a very substantial maintenance effort. In the absence of proof that these additional signs are needed, it is submitted that Section 3314(f) should not be adopted.

V. CONCLUSION

Serious problems exist with respect to the matters set out above in this Statement of Position. In some instances the problems can be resolved by changes in language. In other cases, however, the problems are far more substantive in nature, and in some instances the proposed regulations are unlawful because they are in excess of the adopting agency's statutory authority. The California Hotel & Motel Association wishes to work with the State Building Standards Commission and the other relevant agencies to address these problems and resolve them in an appropriate manner.

Respectfully submitted,
CALIFORNIA HOTEL & MOTEL ASSOCIATION

By ______________________________
Edwin F. Sloan
Executive Vice President

STATE BUILDING STANDARDS COMMISSION

STATE OF CALIFORNIA

re: STATE BUILDING CODE)
PARTS 2, 6, AND 12,)
TITLE 24, CALIFORNIA)
ADMINISTRATIVE CODE)

PUBLIC HEARING

COPY

COMMUNITY CONVENTION CENTER
NEVADA ROOM
14TH AND L STREET
SACRAMENTO, CALIFORNIA

WEDNESDAY, MARCH 23, 1988
10:00 A.M.

VICKI L. MEDEIROS
CSR License No. 7871

MR. ABRAMS: I'm Jim Abrams. I represent the California Hotel and Motel Association. We have changes and recommendations with the access compliance. They are set forth in the statement of position.

I will not go over those now. Two points I think that need to be mentioned, number one, we have been working with the State Architect's Office with respect to the requirement that relate to all the hotel and motel guest rooms that are not required to be accessible to people with mobility impairments.

Although I have not seen the latest revisions that the State Architect's Office has put together, in that regard we have reached agreement in the acceptable language, and that is both sides seeing what we have agreed to. We have put -- as of the last meeting that has been agreed to. The other issue I want to raise, it's a major one and discussed in detail in the statement, has to do with the subject matter of the State Architect's authority with respect to handicap compliance and accessibility.

The statutes that exist in this area made it clear that the State Architect's authority with respect to privately funded buildings, at least the hotel and motels in the State of California, are required to be accessible for those buildings open to the general public. As the State Building Commission knows, and the State Architect's Office knows, over a period of a year, we have only the formal interpretation that holds all places of employment, per se, in the State of California must be accessible to the handicapped of California regardless if they are open to people of the general public.

We have submitted our legal authorities that we feel make it clear that the State Architect's Office has no legislative authority and cannot mandate accessibility in all places of employment. Whether that is good public policy, we cannot decide. The legislature has spoken and that is the law that the Office of State Architect just has to go or live by.

The State Architect, at this point is trying in this regulation to codify the formal opinion for sometime. There is a statement that would make it clear that the accessibility requirements comply to places open to the public. 3103 has definitions of the employee aisle width. Then there is a requirement that notwithstanding the Uniform Building requirements that there be a special clearance aisle leading to the employee area.

Whether that would be the law is something for the legislature to determine. It's based on the opinions given by the State Architect's Office, and building officials have told members of our industry that all places of employment must be accessible to building mobility notwithstanding the statutes and regulation or they will not get building permits, wide aisles, lower bars, and counter tops. With all due respect, that is simply -- there is no authority to require that.

If, in fact, we mention the decision paper, Assembly Bill 4323, by Campbell, would, in fact, if enacted, make the kind of change that the State Architect's Office is trying to do informally by fiat.

The legislature is the place to determine this. If it's passed, effective next year, then they can adopt that legislation. The fact that the bill is introduced shows clearly that the Legislature understands that the current statutes are the one's we're all operating under. The Building Standards Commission and State Architect cannot permit that all places of employment be accessible. We wanted the Building Standards Commission and State Architect's Office to look at this because as far as lodging industry is concerned, the Office of the State Architect is acting in excess of its authority.

We have other points set forth in the statement. I will close and answer any questions.

MR. SKAFF: I would like to paraphrase your other point.

CHAIRMAN CONRAD: That's not appropriate. We want comments on the regulations and do not want to get into debates.

MR. ABRAMS: We are bringing it to your attention in the interest of time.

JACKSON & ABRAMS
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SAN FRANCISCO, CALIFORNIA 94108
(415) 981-4600
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SACRAMENTO OFFICE
770 L STREET, SUITE 960
SACRAMENTO, CA 95814
(916) 442-4584

March 24, 1988

VIA FEDERAL EXPRESS

Ms. Linda Sudderburg
State Building Standards Commission
915 Capitol Mall, Suite 200
Sacramento, CA 95814

Re: Joint Adoption of 1988 Uniform Building Code

Dear Linda:

At the hearing on March 23, 1988, I failed to submit for the record the Statement of Position prepared by Hilton Hotels Corporation in connection with this proceeding. They had asked me to file the document at that time, and I overlooked it. A copy of the document is enclosed herewith for the record. You will note that the document pertains to the Office of State Architect and also to the State Fire Marshal. I have already given a copy of the enclosed to Randy Roxson.

Thank you for your help.

Best regards,

JACKSON & ABRAMS

Jim Ab

James O. Abrams

Enclosure

JOA/slp

RECEIVED
MAR 25 1988
Building Standards Commissio.:

STATE OF CALIFORNIA

BEFORE THE STATE BUILDING STANDARDS COMMISSION

POSITION OF HILTON HOTELS CORPORATION ON THE PROPOSED ADOPTION OF THE 1988 UNIFORM BUILDING CODE WITH AMENDMENTS

MARCH 23, 1988

Thomas G. Daly
Director/Life Safety
Hilton Hotels Corporation
9336 Civic Center Drive
Beverly Hills, CA. 90210

STATEMENT OF HILTON HOTELS CORPORATION

BEVERLY HILLS, CALIFORNIA

ON PROPOSED ADOPTION BY THE OFFICE OF STATE ARCHITECT OF CHANGES IN THE BUILDING STANDARDS OF THE OFFICE OF STATE ARCHITECT

MARCH 22, 1988

Hilton Hotels Corporation, headquartered in Beverly Hills, California, owns, operates or franchises 29 hotels in the State of California and plans development of additional hotels within the state. Hilton Hotels Corporation is, therefore, substantially and materially impacted by the adoption of changes in the Office of State Architect's Building Standards as proposed.

In regard to those changes, Hilton Hotels Corporation has the following objections, suggestions for changes and/or additional language:

1. Chapter 72, Protective Signalling Systems

   A. Procedural Issue

   We do not believe the Office of the State Architect is authorized to implement building standards relative to fire alarm signalling devices since this is under the purview of the Office of State Fire Marshal. Therefore, this language should be withdrawn except to reference similar standards being developed by the Office of State Fire Marshal as indicated in the 1988 Adoption package being specifically, Chapter 18, Section 1807(e)6.C.

   B. Technical Issue

   The proposals by the Office of State Architect, regarding Section 7204(a), is not substantiated in terms of the light level specified. Section 7204(b), percentage of rooms to be equipped, is substantially different from the percentage of rooms to be equipped for the handicapped in general and there is no substantiation as to the need for this additional quantity of rooms.

STATEMENT OF HILTON HOTELS CORPORATION

BEVERLY HILLS, CALIFORNIA

ON THE PROPOSED ADOPTION BY THE STATE FIRE MARSHAL OF CHANGES IN THE BUILDING STANDARDS OF THE OFFICE OF THE STATE FIRE MARSHAL

MARCH 22, 1988

Hilton Hotels Corporation, headquartered in Beverly Hills, California, owns, operates or franchises 29 hotels in the State of California and plans development of additional hotels within the state. Hilton Hotels Corporation is, therefore, substantially and materially impacted by the adoption of the changes in the State Fire Marshal's Building Standards as proposed.

In regard to those changes, Hilton Hotels Corporation has the following objections, suggestions for changes and/or additional language:

1. PROCEDURAL ISSUE

The State Fire Marshal proposes to adopt the 1988 Edition of the Uniform Building Code published by the International Conference of Building Officials (ICBO) of Whittier, Ca., with amendments. The 1988 edition of the Uniform Building Code (UBC) is not available to the public for review in accordance with this proposed adoption. The 1988 UBC will not be available until May of 1988, according to the International Conference of Building Officials. Therefore, the public and property owners who are affected by these proposed changes have not been afforded the opportunity to review this code in light of its basic requirements, nor in light of the amendments proposed by the State of California.

Therefore, we believe that these hearings are premature as to their timing and should be repeated subsequent to a reasonable time period after the publication of the 1988 UBC and before consideration by the State Building Standards Commission.

2. TECHNICAL ISSUES AS TO THE PROPOSED AMENDMENTS BY THE STATE FIRE MARSHAL

The following comments refer only to the amendments proposed by the State Fire Marshal and do not address the basic requirements of the 1988 UBC.

A. Section 1204

The requirement for operable windows for sleeping rooms below the 4th story, should have the following exception:

> "Exception: In buildings protected throughout by a complete approved automatic sprinkler systems, fixed tempered glass may be used in lieu of openable panels."

This modification currently exists in Section 1807 (m)3. Low rise hotel buildings should not be discriminated against since this allowance is provided for high rise hotel buildings and low rise hotels are, pursuant to the adoption of the 1988 UBC, required to have sprinkler systems installed throughout.

B. Section 1718.2. Fire Resistance of Separation Walls

The Code permits for all other occupancy types, a reduction to a non-combustible rating for separation walls between occupancies, when protected by automatic sprinkler systems. This would include hospitals, nursing homes and other occupancies with nonambulatory residents. We are requesting a reduction in the fire resistance of partitions separating guestrooms in Group R1 Division (Hotel) occupancies to 30 minutes fire resistance rating (from 1 hour), when hotels and motels are protected by automatic sprinklers. This 1/2 hour fire resistance rating is consistent with other building codes across the nation (e.g., National Building Code (BOCA) 1987, Section 810.4.1) and the NFPA Life Safety Code (NFPA 101-1985, Section 16-3.6.1, exception). In addition, the 1988 Uniform Building Code will now require hotels more than 2 stories in height to be fully sprinklered. The additional cost associated with this fire protection improvement should be offset by this building construction tradeoff which is not inconsistent with other types of construction tradeoffs offered in the 1988 Uniform Building Code.

C. Section 1807(e)1. Recorded Voice Message for Fire Alarm System

We recommend the deletion of the requirement for a "recorded" voice message based on such changes in the National Fire Protection Association (NFPA) Standard for Voice Communication Systems, NFPA 72F-1985, which rejected the use of such messages due to the inherent danger when occupants heed a message which may direct them to take an unsafe action. The hotel industry has already witnessed tragic injuries to a mother and child who were the victims of such ill founded "recorded" instructions in a fire in Orlando, Florida. The State Fire Marshal should give more consideration to the changed thinking on the use of recorded messages as reflected in the NFPA consensus standard and the real world experiences with such messages. It is not possible to provide one voice message which is correct for all locations within a building. The alert tone should satisfy the need for evacuation.

D. Section 3801(d)

Editorial Correction should be made to the reference to NFPA Standard 14. The correct edition is 1986.

E. Section 3805(a)

The reference to NFPA 14 should be 1986 Edition since there is not a 1985 Edition.

F. Chapter 72, Protective Signalling Systems

General comment is that the editions of the reference standards cited are substantially out of date, some as much as by 20 years. Some standards no longer even exist. Reference to these standards should be updated to the most current edition in order to make the code consistent with modern technology.

ERWIN W. BARTON

COMMITTEES:
CHAIRMAN
HUMAN SERVICES
MEMBER
LIQUOR REGULATION

Texas
House of Representatives

P.O. BOX 2910 AUSTIN, TEXAS 78769 (512) 463-0460
1702 STRAWBERRY, SUITE 300 PASADENA, TEXAS 77502 (713) 475-2899

June 30, 1987

Mr. Don Sievers
6309 Bradley Blvd.
Bethesda, MD 20817

Dear Mr. Sievers:

On June 11, 1987, the Governor of Texas signed into law HB 162 which will require hotels and motels to provide smoke detectors for hearing-impaired persons.

I want to thank you for the assistance you provided to me and my staff in the drafting of this legislation. Your expertise regarding the standards for these smoke detectors was invaluable and contributed to the passage of the bill.

If I can ever be of any assistance to you, please let me know.

Sincerely,

Erwin Barton

Erwin W. Barton

lb

MANFRED OHRENSTEIN
MINORITY LEADER

THE SENATE
STATE OF NEW YORK
ALBANY
12247

February 23, 1987

Mr. Donald Sievers
6309 Bradley Blvd.
Bethseda, MD 20817

Dear Mr. Sievers:

I am pleased to inform you that New York State passed a law, (Chapter 435, Laws 1986) which became effective on January 17, 1987, that would protect the deaf and hearing impaired from the hazards of smoke and fire while staying in this state's hotels, motels, lodging houses and dormitories. As you know, this state has had a stringent statewide fire and building code since 1981 and this amendment to the code is a natural step to ensure that all New Yorkers have a minimum protection from fire and smoke.

I would like to take this opportunity to thank you on behalf of myself, Senator Stachowski and the over one million deaf and hearing impaired New Yorkers. Your technical expertise in helping develop this legislation was invaluable and is largely responsible for our success in seeing this legislation through. You devoted a great deal of your time and effort these past two years in assisting myself and the Senator in this endeavor and for this we are eternally grateful.

Sincerely,

Craig M Burridge

Craig M. Burridge
Senior Legislative Analyst
Office of the
Senate Minority Leader

CMB:d

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, D.C. 20410

OFFICE OF THE ASSISTANT SECRETARY
FOR PUBLIC AND INDIAN HOUSING

August 7, 1987

Mr. Donald Sievers
6309 Bradley Blvd.
Bethseda, MD 20817

Dear Mr. Sievers:

I would like to take this opportunity to thank you on behalf of myself, and the many deaf and hearing impaired Public Housing residents in the United States. Your technical expertise in helping develop the HUD regulations and our success in bidding the Smoke Detectors solicitation was invaluable. You devoted a great deal of your time and effort these past few years in assisting myself and other HUD staff members in this endeavor for which we are greatly appreciative.

Sincerely,

Richard H Kolodin

Richard H, Kolodin, PE
Staff Engineer/Architect

717 783 3016 P.03

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Hotel & Motel
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Tel. 617/ 353-5500
Fax 517/ 353-5527

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DEAF
TPF; RK
S. Duncan
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December 29, 1988

Mr. Harris Wofford
Secretary
Department of Labor and Industry
Room 1700
Labor and Industry Building
7th and Forester
Harrisburg, Pa. 17120

SUBJECT: SENATE BILL 26-1987

Dear

Senate Bill 26-1987 of the General Assembly of Pennsylvania was passed and signed by the Governor. This act required the Department to draft regulations relative to the installation of, among other things, specialized smoke detectors for the deaf and hearing impaired in hotels and motels.

Our question is whether these regulations have been implemented or, if not, an opportunity exists to provide testimony relative to any draft regulations. If either the final or draft regulations are available, I would appreciate your forwarding them to my attention.

Thank you for your assistance.

Sincerely,

Thomas Daly
Chairman
Safety and Fire Protection Committee

cc: Robert Sears
Raymond Ellis
Joe Winter
Larry DeChant
Robert Marcil

TGD/gad

January 24, 1989

Mr. Thomas Daly
Chairman, Safety & Fire Protection Committee
American Hotel & Motel Association
1201 New York Avenue, NW
Washington, D.C.. 20095-3917

Subject: Senate Bill 26-1988

Dear Mr. Daly:

Thank you for your December 29, 1988 letter concerning Senate Bill 26-1988 which was passed by the General Assembly of Pennsylvania and signed by Governor Robert Casey on December 21, 1988. Secretary Harris Wofford requested I respond to your concerns.

Regarding the drafting of regulations to provide the specialized automatic fire detection devices to the deaf and hearing impaired citizens in lodging houses, hotels and motels in the Commonwealth, we will be in the process of implementing the proposed regulations as soon as this Act becomes effective in the middle of February, 1989. It will be a time consuming process for our department to prepare the proposed regulations; however, if you have any input or concerns regarding this matter, please do not hesitate to share them with us. It will be greatly appreciated.

Enclosed you will find a copy of Senate Bill 26, Printer No. 2492 for your review.

Should you have any questions or comments, please feel free to contact me or Assistant Counsel Richard C. Lengler, Office of Chief Counsel at (717) 787-4186.

Sincerely,

Sandy C. Duncan
Director

SCD:jar

Enclosure

cc: Harris Wofford
Thomas Foley
Sandra Christainson
Richard Lengler

D.E. SIEVERS & ASSOCIATES, LTD.

Fire Safety for the Hearing Impaired

March 21,1989

Mr. Sandy Duncan
Director, Office of the Deaf and Hearing Impaired
Labor and Industry Building, Room 160
7th & Forster Streets
Harrisburg, PA 17120

Dear Mr. Duncan:

Thank you for your inquiry into effective visual fire warning for the deaf and hearing impaired, relative to Senate Bill 26 signed into law by Governor Casey. In as much as you are involved in establishing the regulatory implementation of the law, we are very pleased that you wish to receive documentation provided by recognized authorities of visual warning, in order to develop necessary specific requirements.

Accordingly, enclosed please find documentation of ambient light present in various types of occupancies; factors by which the warning light must be increased above the ambient light present, in order to gain the attention of those to be warned [people do not enter occupancies expecting a fire to occur, and therefore do not anticipate a fire warning visual alarm -- it must be bright enough to gain their attention above all other light present]; criteria of how bright the warning light should be in comparison of the ambient light present; and policy of the most widely recognized independent testing and listing laboratory requirements. The above information is compiled from the most recent publications provided by the Illuminating Engineering Society (IES) Handbook, National Fire Protection Association (NFPA) NFPA 72G Notification Appliances for Protective Signaling Systems, and Underwriters Laboratories Standard 1638 (Standard for Visual Signaling Appliances) and correspondance.

We are also including specifications for smoke detectors for the deaf and hearing impaired promulgated by the U.S.Department of Housing and Urban Development, and various state and local statutes and regulations requiring visual alarms for the deaf and hearing impaired

Upon review of the above and enclosed data, I would appreciate your comments, and intended approach to your task ahead. If I can be of additional assistance, including trips to Harrisburg, please feel free to contact me at any time.

Sincerely,

Donald E. Sievers
Fire Safety Consultant, National Association of the Deaf
Member, NFPA 72G Subcommittee Notification Appliances
DES:mo
Enclosures

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SOLICITATION, OFFER AND AWARD

1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350) ▶ RATING

PAGE 1 OF 70 PAGES

2. CONTRACT NO.

3. SOLICITATION NO. IFB-HC-17619-CSP

4. TYPE OF SOLICITATION ☒ SEALED BID (IFB) ☐ NEGOTIATED (RFP)

5. DATE ISSUED 11/29/88

6. REQUISITION/PURCHASE NO. 89-7025

7. ISSUED BY CODE ACS-KK

Dept. of Housing and Urban Development
Office of Procurement and Contracts
451 7th St. S.W., Room 5256
Washington, DC 20410

8. ADDRESS OFFER TO (If other than Item 7)

SAME AS BLOCK 7

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

SOLICITATION

9. Sealed offers in original and 3 copies for furnishing the supplies or services in the Schedule will be received at the place specified in Item 8, or if handcarried, in the depository listed in Same as Block 7 until 10:30 a.m. (Hour) local time 01/10/89 (Date)

Bid opening to be held in Room 5254 at 10:30 a.m. on 1/10/89.

CAUTION - LATE Submissions, Modifications, and Withdrawals: See Section L, Provision No. 52.214-7 or 52.215-10. All offers are subject to all terms and conditions contained in this solicitation.

10. FOR INFORMATION CALL: ▶ A. NAME Ken Kitahara B. TELEPHONE NO. (Include area code) (NO COLLECT CALLS) (202) 755-5585

11. TABLE OF CONTENTS

(✓)	SEC.	DESCRIPTION	PAGE(S)	(✓)	SEC.	DESCRIPTION	PAGE(S)
		PART I - THE SCHEDULE				PART II - CONTRACT CLAUSES	
X	A	SOLICITATION/CONTRACT FORM	1	X	I	CONTRACT CLAUSES	1
X	B	SUPPLIES OR SERVICES AND PRICES/COSTS	2			PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH.	
X	C	DESCRIPTION/SPECS./WORK STATEMENT	5	X	J	LIST OF ATTACHMENTS	34
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X	E	INSPECTION AND ACCEPTANCE	2	X	K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS	8
X	F	DELIVERIES OR PERFORMANCE	2				
X	G	CONTRACT ADMINISTRATION DATA	4	X	L	INSTRS., CONDS., AND NOTICES TO OFFERORS	7
X	H	SPECIAL CONTRACT REQUIREMENTS	2	X	M	EVALUATION FACTORS FOR AWARD	1

OFFER (Must be fully completed by offeror)

NOTE: Item 12 does not apply if the solicitation includes the provisions at 52.214-16, Minimum Bid Acceptance Period.

12. In compliance with the above, the undersigned agrees, if this offer is accepted within ________ calendar days (60 calendar days unless a different period is inserted by the offeror) from the date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s), within the time specified in the schedule.

13. DISCOUNT FOR PROMPT PAYMENT (See Section I, Clause No. 52-232-8) ▶	10 CALENDAR DAYS %	20 CALENDAR DAYS %	30 CALENDAR DAYS %	CALENDAR DAYS %

14. ACKNOWLEDGMENT OF AMENDMENTS (The offeror acknowledges receipt of amendments to the SOLICITATION for offerors and related documents numbered and dated:	AMENDMENT NO.	DATE	AMENDMENT NO.	DATE

15A. NAME AND ADDRESS OF OFFEROR CODE FACILITY

16. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)

15B. TELEPHONE NO. (Include area code)

15C. CHECK IF REMITTANCE ADDRESS IS DIFFERENT FROM ABOVE - ENTER SUCH ADDRESS IN SCHEDULE. ☐

17. SIGNATURE

18. OFFER DATE

AWARD (To be completed by Government)

19. ACCEPTED AS TO ITEMS NUMBERED

20. AMOUNT

21. ACCOUNTING AND APPROPRIATION

22. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION:

☐ 10 U.S.C. 2304(c) ( ) ☐ 41 U.S.C. 253(c) ( )

22. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified) ▶ ITEM

24. ADMINISTERED BY (If other than Item 7) CODE

25. PAYMENT WILL BE MADE BY CODE

Public Housing Agencies or
Indian Housing Authorities.

26. NAME OF CONTRACTING OFFICER (Type or print)

Vito Vollero

27. UNITED STATES OF AMERICA

(Signature of Contracting Officer)

28. AWARD DATE

IMPORTANT - Award will be made on this Form, or on Standard Form 26, or by other authorized official written notice.

7540-01-152-8064
US EDITION NOT USABLE

33-133

STANDARD FORM 33 (REV. 10-83)
Prescribed by GSA; FAR (48 CFR) 53.214(c)

SMOKE DETECTOR SPECIFICATION
LINE VOLTAGE WITH AUDIBLE/VISIBLE SIGNAL

1. General Requirements

   1.1 Audible Smoke Detector

      1.1.1 Shall be photo electric or ionization type in compliance with ANSI/UL 217-1979 (Revised May 19, 1983). The smoke detector shall be labeled certifying that it meets this standard.

      1.1.2 The audible alarm shall be integral with the detector.

      1.1.3 Installation shall be in accordance with ANSI/NFPA 74-1984 (National Electrical Code) and be to a 105-130 volt AC current line which is not controlled by a circuit switch.

2. Visual Smoke Detector

   2.1 Shall be photo electric or photo ionization type with an internally built relay capable of operating up to one ampere load at 120 volt AC current. It shall be in compliance with the requirements as stated in paragraphs 1.1.1 and 1.1.3.

   2.2 A light assembly of xenon strobe type design shall be provided for the purpose of alerting the hearing impaired. It shall have a minimum visible effective intensity of 100 candella with a minimum frequency of 60 but not exceeding 120 flashes per minute as tested and labeled in accordance with UL 1638, effective October 22, 1984. The candella shall be measured by an integrating photo meter.

   2.3 The smoke detector and the xenon strobe light shall be certified by an independent testing laboratory, and installed in accordance with ANSI/NFPA 74-1984 with lettering on the strobe light plate to read "FIRE."

3. Warranty

   3.1 The detector shall be warranted to be free from defects in material and workmanship under conditions of normal use for a period of one year from date of installation.

D.E. SIEVERS & ASSOCIATES, LTD.

Fire Safety for the Hearing Impaired

March 17,1989

Honorable Douglas Walgren
United States Representative
Rayburn Building, Room 2241
Washington, D.C. 20515

Dear Mr. Walgren:

In response to requests by Ms. Molly George and Ms. Glenda Booth, of your staff, the following and attached material is provided. To aid your decision to include fire safety protection for the 8.77% of the general population which is hearing impaired in the Hotel Motel Fire Safety Act H.R.94, enclosed please find Underwriters Laboratories listings for visual smoke alarms, manufacturer pricing, National Fire Protection Association and Illuminating Engineering Society criteria for visual warning. All of the attached data has been verified for accuracy and effectiveness, today. You will note that the one-time purchase price of the portable alarms is a fraction of 1% of the annual cost of disposable amenities. The Division of Internal Revenue also allows a tax deduction of up to $35,000 for "architectural and transportation barrier removal expenses" for audible visual alarms. (see attached).

Since the need for the above data was of an immediate nature, it is being forwarded now, although additional information is also considered essential for you to review.

In the next few days we will provide documentation disputing the contention, by the American Hotel Motel Association and others, that regulation of fire safety in lodging industry is unnecessary. While the opposition to federal regulation contends that state and local regulation is sufficient, the facts simply contradict that contention. We will be forwarding copies of successful,quasi successful, and unsuccessful state legislation and regulation together with the strong opposition to it by the lodging industry in its own written comments and testimony. It is difficult to reconcile, that while the lodging industry and others, present to your committee, on one hand, the alleged "voluntarism" towards fire protective safety devices, -- with the facts stating, that same opposition to visual fire protection for the hearing impaired has been and remains, vigorous.Only four states require effective warning,following UL,NFPA and IES criteria; six states and five cities require some warning; and one state has adamantly opposed effective warning of any kind for the deaf,and adopted the American Hotel Motel Association opposition verbatum.

In addition, we suggest that a copy of the report required of the U.S. Fire Administration by H.R. 4419, 1988 be obtained, since it has not yet been released. We are told by USFA staff that it supports the need for visual alarms for the hearing impaired.

We would welcome the opportunity to meet with you and your staff, and testify before Committee, on this issue of vital con-

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D.E. SIEVERS & ASSOCIATES, LTD.

Fire Safety for the Hearing Impaired

Honorable Douglas Walgren
March 17,1989
Page 2

cern. While the American Hotel Motel Association has told the U.S. Fire Administration,"the deaf do not need visual alarms, the smoke will alert them"; the statement is neither logical nor true. Visual smoke alarms for the hearing impaired are critically needed, and need to be required, since visual warning of imminent danger is the only viable warning they have.

Upon your review of the enclosed material, we would very much appreciate the opportunity to discuss the data and provide any assistance you may wish us to contribute.

Very respectfully,

Donald E. Sievers
Fire Safety Consultant, National Association of the Deaf
Member, NFPA 72G Subcommittee on Notification Appliances
DES:mo
Enclosures
cc: Mr. Lawrence Newman, Pres., National Association of the Deaf
Mr. Gary Olsen, Exec. Dir.,National Association of the Deaf

D.E. SIEVERS & ASSOCIATES, LTD.

Fire Safety for the Hearing Impaired

UNDERWRITERS LABORATORIES LISTED SMOKE DETECTORS WITH VISUAL SIGNALING

Manufacturer	Model ID	Candela Rating	$ List	/$ Selling	Mode
Whelen Eng.Co.	Strobe Alarm	120.0	225.00	165.00	Portable
	SD/VSA	120.0	250.00	175.00	Hardwire
Strobe Alert	SA-100	13.0	Discontinued		Portable
	SA-100A	23.0	Discontinued		Portable
Flash Alert Inc. (Replaced Strobe Alert)	Flash Alert	100.0	149.00	149.00	Portable
Gentex	710CS	15.0	160.00	160.00	Hardwire
	710LS	15.0	180.00	180.00	Portable
Mackagen	981DC	1.36	79.95	79.95	Portable

(Note: The above information verified effective 3/16/89 by UL and Manufacturers/distributors 3/16-17/89)

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UL
UNDERWRITERS LABORATORIES INC.®
333 PFINGSTEN ROAD · NORTHBROOK, ILLINOIS 60062—2096
an independent, not-for-profit organization testing for public safety

October 26, 1988

D. E. Sievers & Associates, Ltd.
Mr. Donald E. Sievers
6309 Bradley Blvd.
Bethesda, MD 20817-3243

Subject: Effective Intensity

Dear Don:

This is in response to your letter of October 18, 1988, in which you address several questions concerning the method of light intensity measurements concerning UL 1638 and its relationship to NFPA Guide 72G. At the present time, our Standard UL 1638 describes the method of measuring effective intensity in candela. The procedure involves measuring several flashes of light from a visual signal appliance and by means of an integration formula calculating the effective intensity over the entire flash cycle. This is not peak candlepower.

At the present time, we are unaware of any correlation procedure involving peak candlepower versus effective intensity. UL does not accept or use any value of peak candlepower. There are a number of manufacturers who elect to rate devices in peak candlepower, but since there appears to be an inconsistency between manufacturers as to how this measurement is made, the Laboratories has elected to stay with the effective intensity value as described in the Illuminating Engineering Society Handbook, Fifth Edition.

Underwriters Laboratories does require that all manufacturers who are Listed under the Visual Signal Appliance category provide ratings which are displayed on the product or referenced in their installation literature with the intention that this information be used in accordance with the National Fire Protection Association Guide 72G. The 72G Guide does provide an outline for the use of direct viewing visual signaling appliances with different ambient conditions.

Look For The Ⓤ Listing or Classification Mark On The Product

Phone: (312) 272-8800 MCI Mail No.: 254-3343 Cable: ULINC NORTHBROOK, IL MCI Telex No.: 6502543343 FAX No.: (312) 272-8129

I hope that this answers all of your questions mentioned in your letter, and if you have any additional questions, please feel free to contact the writer.

Very truly yours,

Ferd DeVoss

FERD DE VOSS (Ext. 2614)
Engineering Group Leader
Burglary Protection and
Signaling Department

FD:gl
LET11

ANSI/NFPA 72G An American National Standard February 6, 1989

NFPA 72G
Notification Appliances for Protective Signaling Systems
1989 Edition

NFPA

National Fire Protection Association Batterymarch Park, Quincy, MA 02269

Where audible appliances are installed in mechanical equipment rooms for any of the above occupancies, the average ambient sound level that may be used for design guidance is at least 85 dBA for all occupancies.

3-2 Visible Characteristics, Public Mode.

3-2.1 Two methods of primary visible signaling detection are defined; however, specific hardware may or may not incorporate both methods.

3-2.1.1 Direct. A visible signaling method in which the message of notification of an emergency condition is conveyed by direct viewing of the illuminating element within or attached to the signaling appliance.

3-2.1.2 Indirect. A visible signaling method in which the message of notification of an emergency condition is conveyed by means of illumination of the area surrounding the visible signaling appliance.

3-2.1.3 The average illuminance for various activities as listed below may be used for design guidance for selection of an appropriate visible signaling appliance:

Type of Activity	
Public spaces with dark surroundings	2.5 lumens/sq ft
Simple orientation for short temporary visits	5-10 lumens/sq ft
Working spaces where visual tasks are only occasionally performed	10-20 lumens/sq ft
Performance of visual tasks of high contrast or large size	20-50 lumens/sq ft
Performance of visual tasks of medium contrast or small size	50-100 lumens/sq ft
Performance of visual tasks of low contrast or very small size	100-200 lumens/sq ft

3-2.2 Supplementary Visible Signaling Method.

3-2.2.1 A supplementary visible signal is intended to augment an audible or primary visible signal.

3-2.2.2 A supplementary visible signal need not meet the light intensity recommendations of the primary visible signal, but should comply with its marked rated performance.

3-2.2.3 The combined effective intensity of the supplementary and primary visible appliances should not exceed the upper limits permitted for the primary visible signal.

3-2.3 Light Pulse Characteristics.

3-2.3.1 A specification value should not exceed three flashes per second and should be not slower than one flash every three seconds.

3-2.3.2 A maximum pulse duration should be two-tenths (0.2 sec) of one second with a maximum duty cycle of 40 percent. The pulse duration is defined as the time interval between initial and final points of 10 percent of maximum signal.

3-2.3.3 The light source color is nominal white, unless another color is required by the authority having jurisdiction.

3-2.4 Direct Primary Appliance Photometrics.

3-2.4.1 Visible signaling appliances used to produce a direct signal should be located so that an appliance can be seen by the intended viewers and should be of a type, size, intensity, and number so that the viewer can discern when they have been illuminated, regardless of the viewer's orientation.

3-2.4.1.1 Where the average illuminance is less than 5 lumens per sq ft, a visible signaling appliance should be a pulsing light and have an effective intensity rating between 0.15 and 15 candela.

3-2.4.1.2 Where the average illuminance is more than 5 lumens per sq ft, a visible signaling appliance should be a pulsing light and have an effective intensity rating between 15 and 150 candela.

3-2.4.1.3 Where the average illuminance is more than 20 lumens per sq ft and motion is present, a visible signaling appliance should be a pulsing light and have an effective intensity rating between 100 and 1000 candela.

hotels

3-2.5 Indirect Primary Appliance Photometrics.

3-2.5.1 Indirect primary visible signaling appliances should be of a type and intensity and should be so located to alert persons in the protected area without causing eye damage.

3-2.5.1.1 The average effective illuminance of the pulsing signal at a standard nominal work plane 30 in. (0.76 m) above the floor should be a minimum of one-tenth the steady state spatially averaged work plane illuminance at the standard nominal plane in the room.

3-2.5.1.2 For an appliance mounted on or adjacent to a wall, it is recommended that not more than 15 percent of its output be directly incident on the plane of the wall and not more than 25 percent be incident on the ceiling within 45° of the vertical through the appliance. A minimum of 40 percent of the output should be between the horizontal and +30° from the horizontal.

3-2.5.1.3 No direct viewing of the lamp should be permitted from below the horizontal plane. No optical element, either lens or reflector, should be optically active externally at angles below the horizontal. A part of the optical component within the field of view should be permitted, provided it is not directing light to that region.

Exception: Combination indirect and direct viewing appliances should be permitted if the direct viewing component does not exceed an effective intensity of 1000 candela.

3-3 Visible Characteristics, Private Mode.

3-3.1 Visible signals used in the private mode should be adequate for their intended purpose.

3-4 Approval and Acceptance.

3-4.1 The authority having jurisdiction should be notified per cent probability of detection. The threshold illuminance values shown are applicable only when the observer knows precisely where to look for the light. Even if the illuminance is twice the values shown the light will be hard to find. The illuminance values must be increased by a factor of 5 to 10 if the light is to be easy to find.[69]

These increases in illuminance are applicable only when the observer is looking for the light signal. Much greater increases are needed if the light signal is to attract the attention of an observer who is not searching for it. Factors of 100 to 1000 are not excessive.[70]

The break in the curve represents the changes from cone to rod vision. At low background luminances, the threshold illuminance for cone vision remains essentially unchanged as indicated by the broken line at the left. The horizontal portion of the curve represents most night seeing conditions since a light used as a signal is usually observed by looking directly at it; hence cone, not rod, vision is used. Moreover, it is doubtful whether those engaged in transport, with the possible exception of lookouts on ships, ever reach the state of dark adaptation required for rod vision.

Representative background luminances are in Fig. 3-44. It should be noted that the luminance of the night sky in the vicinity of cities and airports seldom falls below 0.003 candela per square meter because of the effects of man-made sources. Note also that, unless there are glare sources in the field of view, it is probably necessary to consider only the background in the immediate vicinity of the light.[71]

Source Size. The threshold illuminance values shown in Fig. 3-43 are applicable to sources which are in effect point sources. Fig. 3-45 shows the maximum diameter of a source which may be considered a point source.[72] Most signal lights behave as point sources. Approximate thresholds for sources which are too large to be considered point sources may be obtained by multiplying the thresholds obtained from Fig. 3-43 by the size factors given in Fig. 3-46.[73]

Figs. 3-45 and 3-46 apply only to threshold and near threshold viewing. Recent work has shown that the intensity of a red traffic signal light required to produce optimum recognition under bright daylight conditions is independent of source size for sources subtending up to 16.5 minutes of arc.[74]

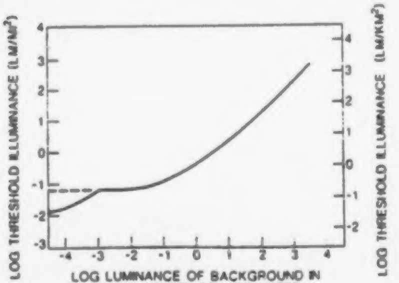

Fig. 3-43. Threshold illuminance at the eye from an achromatic (white) point source for about 98 per cent probability of detection as a function of the background luminance

Fig. 3-44. Representative Luminance Values of Various Backgrounds Against Which Luminous Signals are Viewed

Background	Representative Luminance
	Candelas per Square Meter
Horizon sky	
Overcast, no moon	0.00003
Clear, no moon	.0003
Overcast, moon	.003
Clear, moonlight	.03
Deep twilight	.3
Twilight	3
Very dark day	30
Overcast day	300
Clear day	3000
Clouds, sun-lighted	30000
Daylight fog	
Dull	300–1000
Typical	1000–3000
Bright	3000–16000
Ground	
On overcast day	30–100
On sunny day	300
Snow, full sunlight	16000

Colored Light Signals

The threshold for the identification of the color of a light signal is about the same as the cone-threshold for detection of that light. At the spectral extremes these threshold values are nearly identical, but at the center of the visible spectrum the cone-threshold for detection may be as much as a half a log unit lower. In the luminance range between absolute rod-threshold and the cone-threshold for identification of color (about three log units) no perception of hue can be made. This luminance range is known as the photochromatic interval.[75] Thus, color discrimi-

Fig. 2-2. Currently Recommended Illuminance Categories and Illuminance Values for Lighting Design—Target Maintained Levels

The tabulation that follows is a consolidated listing of the Society's current illuminance recommendations. This listing is intended to guide the lighting designer in selecting an appropriate illuminance for design and evaluation of lighting systems.

Guidance is provided in two forms (1), in Parts I, II and III as an *Illuminance Category*, representing a range of illuminances (see page *2-4* for a method of selecting a value within each illuminance range), and *(2)*, in parts *IV, V and VI* as an *Illuminance Value*. Illuminance Categories are represented by letter designations A through I. Illuminance Values are given in *lux* with an approximate equivalence in *footcandles* and as such are intended as *target* (nominal) values with deviations expected. These target values also represent *maintained* values (see page 2-24).

This table has been divided into the six parts for ease of use. Part I provides a listing of both Illuminance Categories and Illuminance Values for generic types of interior activities and normally is to be used when Illuminance Categories for a specific Area/Activity cannot be found in parts II and III. Parts IV, V and VI provide target maintained Illuminance Values for outdoor facilities, sports and recreational areas, and transportation vehicles where special considerations apply as discussed on page 2-4.

In all cases the recommendations in this table are based on the assumption that the lighting will be properly designed to take into account the visual characteristics of the task. See the design information in the particular application sections in this Application Handbook for further recommendations.

I. Illuminance Categories and Illuminance Values for Generic Types of Activities in Interiors

Type of Activity	Illuminance Category	Ranges of Illuminances		Reference Work-Plane
		Lux	Footcandles	
Public spaces with dark surroundings	A	20-30-50	2-3-5	General lighting throughout spaces
Simple orientation for short temporary visits	B	50-75-100	5-7.5-10	
Working spaces where visual tasks are only occasionally performed	C	100-150-200	10-15-20	
Performance of visual tasks of high contrast or large size	D	200-300-500	20-30-50	Illuminance on task
Performance of visual tasks of medium contrast or small size	E	500-750-1000	50-75-100	
Performance of visual tasks of low contrast or very small size	F	1000-1500-2000	100-150-200	
Performance of visual tasks of low contrast and very small size over a prolonged period	G	2000-3000-5000	200-300-500	Illuminance on task, obtained by a combination of general and local (supplementary lighting)
Performance of very prolonged and exacting visual tasks	H	5000-7500-10000	500-750-1000	
Performance of very special visual tasks of extremely low contrast and small size	I	10000-15000-20000	1000-1500-2000	

II. Commercial, Institutional, Residential and Public Assembly Interiors

Area/Activity	Illuminance Category
Air terminals (see Transportation terminals)	
Armories	C[1]
Art galleries (see Museums)	
Auditoriums	
Assembly	C[1]
Social activity	B
Banks (also see Reading)	
Lobby	
General	C
Writing area	D
Tellers' stations	E[2]
Barber shops and beauty parlors	E
Churches and synagogues	(see page 7-2)[4]
Club and lodge rooms	
Lounge and reading	D
Conference rooms	
Conferring	D
Critical seeing (refer to individual task)	
Court rooms	
Seating area	C
Court activity area	E
Dance halls and discotheques	B

For footnotes, see page 2-19

Fig. 2-2. *Continued*

II *Continued*

Area/Activity	Illuminance Category
Chemistry rooms	E
Bacteriology rooms	
General	E
Reading culture plates	F
Hematology	E
Linens	
Sorting soiled linen	D
Central (clean) linen room	D
Sewing room, general	D
Sewing room, work area	E
Linen closet	B
Lobby	C
Locker rooms	C
Medical illustration studio[17, 18]	F
Medical records	E
Nurseries[17]	
General[18]	C
Observation and treatment	E
Nursing stations[17]	
General	D
Desk	E
Corridors, day	C
Corridors, night	A
Medication station	E
Obstetric delivery suite[17]	
Labor rooms	
General	C
Local	E
Birthing room	F
Delivery area	
Scrub, general	G
General	G
Delivery table	(see page 7-15)
Resuscitation	G
Postdelivery recovery area	E
Substerilizing room	B
Occupational therapy[17]	
Work area, general	D
Work tables or benches	E
Patients rooms[17]	
General[18]	B
Observation	A
Critical examination	E
Reading	D
Toilets	D
Pharmacy[17]	
General	E
Alcohol vault	D
Laminar flow bench	F
Night light	A
Parenteral solution room	D
Physical therapy departments	
Gymnasiums	D
Tank rooms	D
Treatment cubicles	D
Postanesthetic recovery room[17]	
General[18]	E
Local	H
Pulmonary function laboratories[17]	E

Area/Activity	Illuminance Category
Radiological suite[17]	
Diagnostic section	
General[18]	A
Waiting area	A
Radiographic/fluoroscopic room	A
Film sorting	F
Barium kitchen	E
Radiation therapy section	
General[18]	B
Waiting area	B
Isotope kitchen, general	E
Isotope kitchen, benches	E
Computerized radiotomography section	
Scanning room	B
Equipment maintenance room	E
Solarium	
General	C
Local for reading	D
Stairways	C
Surgical suite[17]	
Operating room, general[17]	F
Operating table	(see page 7-12)
Scrub room[18]	E
Instruments and sterile supply room	D
Clean up room, instruments	E
Anesthesia storage	C
Substerilizing room	C
Surgical induction room[17, 18]	E
Surgical holding area[17, 18]	E
Toilets	C
Utility room	D
Waiting areas[17]	
General	C
Local for reading	D
Homes (see Residences)	
Hospitals (see Health care facilities)	
Hotels	
Bathrooms, for grooming	D
Bedrooms, for reading	D
Corridors, elevators and stairs	C
Front desk	E[3]
Linen room	
Sewing	F
General	C
Lobby	
General lighting	C
Reading and working areas	D
Canopy (see Part IV, Outdoor Facilities)	
Kitchens (see Food service facilities or Residences)	
Libraries	
Reading areas (see Reading)	
Book stacks (vertical 760 millimeters (30 inches) above floor)	
Active stacks	D
Inactive stacks	B
Book repair and binding	D

For footnotes see page 2-19. For illuminance ranges for each Illuminance Category, see page 2-5.

Standard Handbook for Electrical Engineers

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given direction per unit of projected area of the surface as viewed from that direction. See Table 22-1.

Footlambert is a unit of luminance (photometric brightness) equal to $1/\pi$ candela per square foot, or to the uniform luminance of a perfectly diffusing surface emitting or reflecting light at the rate of one lumen per square foot, or to the average luminance of any surface emitting or reflecting light at that rate. The average luminance of any reflecting surface in footlamberts is, therefore, the product of the illumination in footcandles by the reflectance of the surface.

Candelas per square meter is the International System (SI) unit of luminance when the meter is taken as the unit of length. Another term for this unit is *nit*, which is not commonly used in North America.

TABLE 22-2. Conversion Factors for Lighting Units

A. Illumination

1 footcandle = 1 lumen per square foot
1 lumen-hour = 60 lumen-minutes
1 lux = 1 lumen per square meter = 1 meter-candela
1 phot = 1 lumen per square centimeter

Number of → Multiplied by ↘ Equals number of ↓	Footcandles	Lux	Phots	Milliphots
Footcandles	1	0.0929	929	0.929
Lux	10.76	1	10,000	10
Phots	0.00108	0.0001	1	0.001
Milliphots	1.076	0.1	1,000	1

B. Luminance

1 footlambert = 1 lumen per square foot
1 millilambert = 0.001 lambert
1 apostilb (international) = 0.1 millilambert
1 lambert = 1 lumen per square centimeter
1 stilb = 1 candela per square centimeter
1 nit = 1 candela per square meter

Number of → Multiplied by ↘ Equals number of ↓	Foot-lamberts	Candelas per square meter	Milli-lamberts	Candelas per square inch	Candelas per square foot	Stilbs
Footlamberts	1	0.2919	0.929	452	3.142	2919
Candelas per sq m	3.426	1	3.183	1550	10.76	10,000
Millilamberts	1.076	0.3142	1	487	3.382	3142
Candelas per sq in	0.00221	0.000645	0.00205	1	0.00694	6.45
Candelas per sq ft	0.3183	0.0929	0.2957	144	1	929
Stilbs	0.00034	0.0001	0.00032	0.155	0.00108	1

6. **Luminous efficacy** is a quantity denoting the effectiveness of light sources. It is the ratio of the total luminous flux (lumens) to the total power input (watts). (The term *luminous efficiency* has in the past been extensively used for this quantity.) The maximum luminous efficacy of an "ideal" white source, defined as a radiator with constant output over the visible spectrum, is approximately 220 lumens per watt.

7. **Reflectance** (ρ) is the ratio of reflected flux to incident flux. Measured values of reflectance depend upon the angles of incidence and view and on the spectral character of the incident flux. Because of the dependence, the angles of incidence and view and the spectral characteristics of the source should be specified.

8. **Transmittance** (τ) is the ratio of the transmitted flux to the incident flux. Measured values of transmittance depend upon the angle of incidence, the method of measurement of the transmitted flux, and the spectral character of the incident flux. Because of this dependence, complete information on the technique and conditions of measurement should be specified.

9. **Absorptance** (α) is the ratio of the flux absorbed by a medium to the incident flux. The sum of reflectance, transmittance, and absorptance is one.

10. **Brightness** is the term that refers to the intensity of sensation resulting from viewing light sources and surfaces. This sensation is determined in part by the definitely measurable luminance defined above and in part by conditions of observation such as the state of adaptation of the eye. In much of the literature the term brightness, used alone,

Sec. 1887. Amendments to the Trade Act of 1974.
Sec. 1888. Amendments to the Tariff Act of 1930.
Sec. 1890. Amendments to the Caribbean Basin Economic Recovery Act.
Sec. 1891. Conforming amendments regarding customs brokers.
Sec. 1892. Special effective date provisions for certain articles given duty-free treatment under the Trade and Tariff Act of 1984.
Sec. 1893. Technical amendments relating to customs user fees.

Subtitle C—Miscellaneous

CHAPTER 1—AMENDMENTS RELATED TO THE CONSOLIDATED OMNIBUS BUDGET RECONCILIATION ACT OF 1985

Sec. 1895. COBRA technical corrections relating to Social Security Act programs.
Sec. 1896. Extension of time for filing for credit or refund with respect to certain changes involving insolvent farmers.
Sec. 1897. Correction of clerical error in amendments to coal tax.

CHAPTER 2—AMENDMENTS RELATED TO THE RETIREMENT EQUITY ACT OF 1984

Sec. 1898. Technical corrections to the Retirement Equity Act of 1984.

CHAPTER 3—AMENDMENT RELATED TO THE CHILD SUPPORT ENFORCEMENT AMENDMENTS OF 1984

Sec. 1899. Amendment related to the Child Support Enforcement Amendments of 1984.

CHAPTER 4—MISCELLANEOUS AMENDMENTS CORRECTING ERRORS OF SPELLING, PUNCTUATION, ETC.

Sec. 1899A. Miscellaneous amendments correcting errors of spelling, punctuation, etc.

SEC. 2. INTERNAL REVENUE CODE OF 1986.

(a) REDESIGNATION OF 1954 CODE.—The Internal Revenue Title enacted August 16, 1954, as heretofore, hereby, or hereafter amended, may be cited as the "Internal Revenue Code of 1986".

(b) REFERENCES IN LAWS, ETC.—Except when inappropriate, any reference in any law, Executive order, or other document—

(1) to the Internal Revenue Code of 1954 shall include a reference to the Internal Revenue Code of 1986, and

(2) to the Internal Revenue Code of 1986 shall include a reference to the provisions of law formerly known as the Internal Revenue Code of 1954.

SEC. 3. AMENDMENT OF 1986 CODE; COORDINATION WITH SECTION 15.

(a) AMENDMENT OF 1986 CODE.—Except as otherwise expressly provided, whenever in this Act an amendment or repeal is expressed in terms of an amendment to, or repeal of, a section or other provision, the reference shall be considered to be made to a section or other provision of the Internal Revenue Code of 1986.

(b) COORDINATION WITH SECTION 15.—

(1) IN GENERAL.—Except as provided in paragraph (2), for purposes of section 15 of the Internal Revenue Code of 1986, no amendment or repeal made by this Act shall be treated as a change in the rate of a tax imposed by chapter 1 of such Code.

(2) EXCEPTION.—Paragraph (1) shall not apply to the amendment made by section 601 (relating to corporate rate reductions).

tributive share which is not allowable as a deduction to A.

[T.D. 7634, 44 FR 43270, July 24, 1979]

§ 1.190-2 Definitions.

For purposes of section 190 and the regulations thereunder—

(a) **Architectural and transportation barrier removal expenses.** The term "architectural and transportation barrier removal expenses" means expenditures for the purpose of making any facility, or public transportation vehicle, owned or leased by the taxpayer for use in connection with his trade or business more accessible to, or usable by, handicapped individuals or elderly individuals. For purposes of this section—

(1) The term "facility" means all or any portion of buildings, structures, equipment, roads, walks, parking lots, or similar real or personal property.

(2) The term "public transportation vehicle" means a vehicle, such as a bus, a railroad car, or other conveyance, which provides to the public general or special transportation service (including such service rendered to the customers of a taxpayer who is not in the trade or business of rendering transportation services).

(3) The term "handicapped individual" means any individual who has—

(i) A physical or mental disability (including, but not limited to, blindness or deafness) which for such individual constitutes or results in a functional limitation to employment, or

(ii) A physical or mental impairment (including, but not limited to, a sight or hearing impairment) which substantially limits one or more of such individual's major life activities, such as performing manual tasks, walking, speaking, breathing, learning, or working.

(4) The term "elderly individual" means an individual age 65 or over.

(b) **Qualified architectural and transportation barrier removal expense**—(1) *In general.* The term "qualified architectural and transportation barrier removal expense" means an architectural or transportation barrier removal expense (as defined in paragraph (a) of this section) with respect to which the taxpayer establishes, to the satisfaction of the Commissioner or his delegate, that the resulting removal of any such barrier conforms a facility or public transportation vehicle to all the requirements set forth in one or more of paragraphs (b)(2) through (22) of this section or in one or more of the subdivisions of paragraph (b)(20) or (21). Such term includes only expenses specifically attributable to the removal of an existing architectural or transportation barrier. It does not include any part of any expense paid or incurred in connection with the construction or comprehensive renovation of a facility or public transportation vehicle or the normal replacement of depreciable property. Such term may include expenses of construction, as, for example, the construction of a ramp to remove the barrier posed for wheelchair users by steps. Major portions of the standards set forth in this paragraph were adapted from "American National Standard Specifications for Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped" (1971), the copyright for which is held by the American National Standards Institute, 1430 Broadway, New York, New York 10018.

(2) **Grading.** The grading of ground, even contrary to existing topography, shall attain a level with a normal entrance to make a facility accessible to individuals with physical disabilities.

(3) **Walks.** (i) A public walk shall be at least 48 inches wide and shall have a gradient not greater than 5 percent. A walk of maximum or near maximum grade and of considerable length shall have level areas at regular intervals. A walk or driveway shall have a nonslip surface.

(ii) A walk shall be of a continuing common surface and shall not be interrupted by steps or abrupt changes in level.

(iii) Where a walk crosses a walk, a driveway, or a parking lot, they shall blend to a common level. However, the preceding sentence does not require the elimination of those curbs which are a safety feature for the handicapped, particularly the blind.

(iv) An inclined walk shall have a level platform at the top and at the bottom. If a door swings out onto the platform toward the walk, such platform shall be at least 5 feet deep and 5 feet wide. If a door does not swing onto the platform or toward the walk, such platform shall be at least 3 feet deep and 5 feet wide. A platform shall extend at least 1 foot beyond the strike jamb side of any doorway.

(C) Has a door, if any, that is at least 32 inches wide and swings out;

(D) Has a handrail on one side, 33 inches high and parallel to the floor, 1½ inches in outside diameter, 1½ inches clearance between rail and wall, and fastened securely at ends and center; and

(E) Has a water closet with a seat 19 to 20 inches from the finished floor, centerline located 18 inches from the side wall on which the handrail is located.

(iv) A toilet room shall have lavatories with narrow aprons. Drain pipes and hot water pipes under a lavatory shall be covered or insulated.

(v) A mirror and a shelf above a lavatory shall be no higher than 40 inches above the floor, measured from the top of the shelf and the bottom of the mirror.

(vi) A toilet room for men shall have wall-mounted urinals with the opening of the basin 15 to 19 inches from the finished floor or shall have floor-mounted urinals that are level with the main floor of the toilet room.

(vii) Towel racks, towel dispensers, and other dispensers and disposal units shall be mounted no higher than 40 inches from the floor.

(11) Water fountains. (i) A water fountain and a cooler shall have upfront spouts and controls.

(ii) A water fountain and a cooler shall be hand-operated or hand-and-foot-operated.

(iii) A water fountain mounted on the side of a floor-mounted cooler shall not be more than 30 inches above the floor.

(iv) A wall-mounted, hand-operated water cooler shall be mounted with the basin 36 inches from the floor.

(v) A water fountain shall not be fully recessed and shall not be set into an alcove unless the alcove is at least 36 inches wide.

(12) Public telephones. (i) A public telephone shall be placed so that the dial and the headset can be reached by individuals in wheelchairs.

(ii) A public telephone shall be equipped for those with hearing disabilities and so identified with instructions for use.

(iii) Coin slots of public telephones shall be not more than 48 inches from the floor.

(13) Elevators. (i) An elevator shall be accessible to, and usable by the handicapped or the elderly on the levels they use to enter the building and all levels and areas normally used.

(ii) Cab size shall allow for the turning of a wheelchair. It shall measure at least 54 by 68 inches.

(iii) Door clear opening width shall be at least 32 inches.

(iv) All essential controls shall be within 48 to 54 inches from cab floor. Such controls shall be usable by the blind and shall be tactilely identifiable.

(14) Controls. Switches and controls for light, heat, ventilation, windows, draperies, fire alarms, and all similar controls of frequent or essential use, shall be placed within the reach of individuals in wheelchairs. Such switches and controls shall be no higher than 48 inches from the floor.

(15) Identification. (i) Raised letters or numbers shall be used to identify a room or an office. Such identification shall be placed on the wall to the right or left of the door at a height of 54 inches to 66 inches, measured from the finished floor.

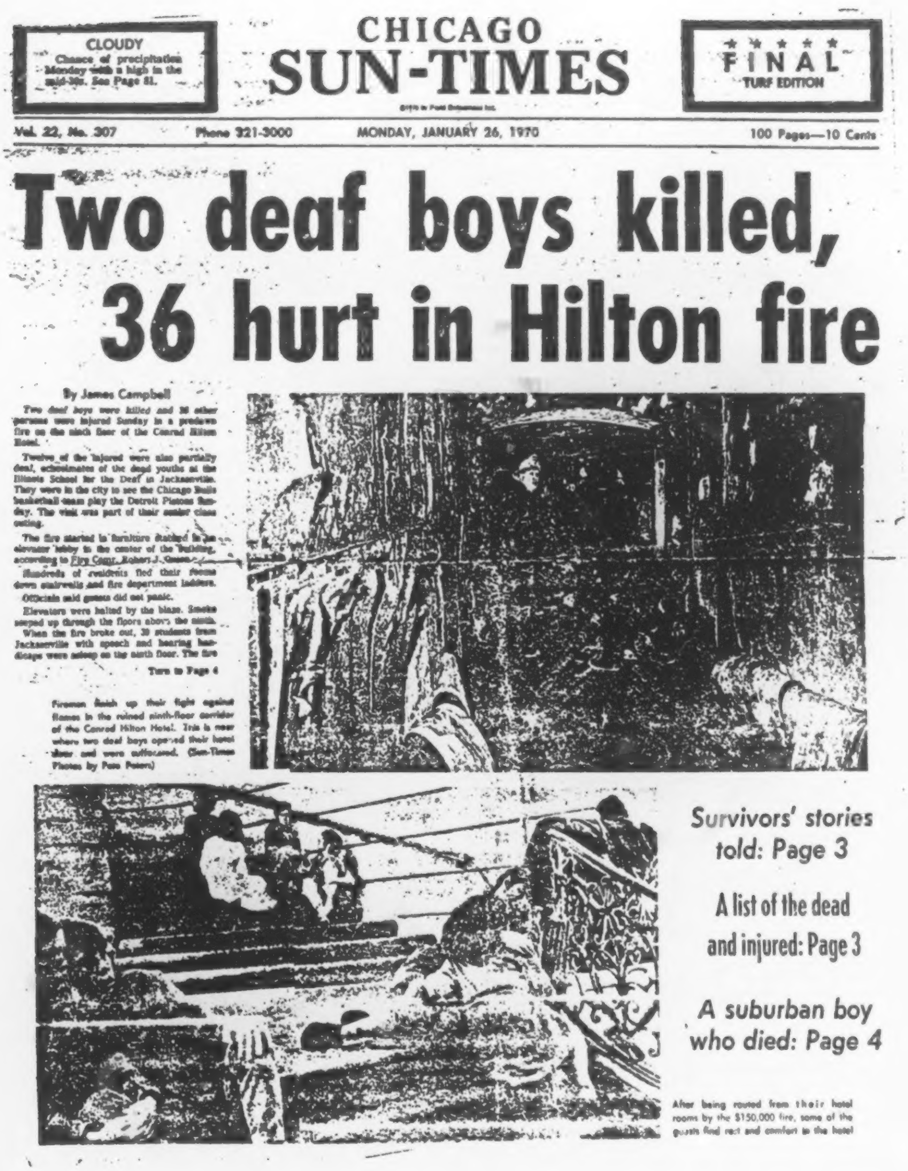
(ii) A door that might prove dangerous if a blind person were to exit or enter by it (such as a door leading to a loading platform, boiler room, stage, or fire escape) shall be tactilely identifiable.

(16) Warning signals. (i) An audible warning signal shall be accompanied by a simultaneous visual signal for the benefit of those with hearing disabilities.

(ii) A visual warning signal shall be accompanied by a simultaneous audible signal for the benefit of the blind.

(17) Hazards. Hanging signs, ceiling lights, and similar objects and fixtures shall be placed at a minimum height of 7 feet, measured from the floor.

(18) International accessibility symbol. The international accessibility symbol (see illustration) shall be displayed on routes to and at wheelchair-accessible entrances to facilities and public transportation vehicles.



CLOUDY
Chance of precipitation Monday with a high in the mid-30s. See Page 81.

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Vol. 22, No. 307 Phone 321-3000 MONDAY, JANUARY 26, 1970 100 Pages—10 Cents

Two deaf boys killed, 36 hurt in Hilton fire

By James Campbell

Two deaf boys were killed and 36 other persons were injured Sunday in a predawn fire on the ninth floor of the Conrad Hilton Hotel.

Twelve of the injured were also partially deaf, schoolmates of the dead youths at the Illinois School for the Deaf in Jacksonville. They were in the city to see the Chicago Bulls basketball team play the Detroit Pistons Sunday. The visit was part of their senior class outing.

The fire started in furniture stacked in an elevator lobby in the center of the building, according to Fire Comr. Robert J. Quinn.

Hundreds of residents fled their rooms down stairwells and fire department ladders.

Officials said guests did not panic.

Elevators were halted by the blaze. Smoke seeped up through the floors above the ninth.

When the fire broke out, 30 students from Jacksonville with speech and hearing handicaps were asleep on the ninth floor. The fire

Turn to Page 4

Firemen finish up their fight against flames in the ruined ninth-floor corridor of the Conrad Hilton Hotel. This is near where two deaf boys opened their hotel door and were suffocated. (Sun-Times Photos by Pete Peters)

Survivors' stories told: Page 3

A list of the dead and injured: Page 3

A suburban boy who died: Page 4

After being routed from their hotel rooms by the $150,000 fire, some of the guests find rest and comfort in the hotel

6 CHICAGO SUN-TIMES, Mon., Jan. 26, 1970

BRUCE KENNEDY
Morton Grove lad is one of two handicapped boys killed.

Fire victim

Entire neighborhood's loss

By William Granger

The neighbors on Frontage Road in Morton Grove all lost a child when Bruce Kennedy died in the Conrad Hilton Hotel fire Sunday.

The family of Mr. and Mrs. David Kennedy and several other families first settled on the two-block long street in the northwest suburb 28 years ago. Their children grew up together.

Bruce was partially deaf; so are his parents. A brother, James, has cerebral palsy.

Love, not pity

"They've had their share of bad luck," said a neighbor, Mrs. Jack Rossmann. "But never a complaint. Sometimes it seems too much misfortune is given to one family."

The Kennedys were not pitied for their handicaps; they were loved for their generosity and good spirits.

David Kennedy, a draftsman, is active in several groups helping the deaf. Connie Kennedy, Bruce's mother, is cheerful, always helping the neighbors. She worked a while in the Skokie post office to help raise money to send Bruce to college in the fall.

It was tough for Bruce, who grew up sharing the partial deafness of his parents.

He learned sign language at home but it did not help him to speak well. Some of the neighbors were enlisted to help Bruce.

Mrs. Rossmann recalled: "I'd have an apple and I'd say to him, 'Do you want this, Bruce?' He'd nod and I'd tell him to name it, and he would just stand there and point to it. Finally, he'd say, 'Apple,' and I'd give it to him."

Bruce loved dirt car racing. He won several area championships, and a section of the modest brick Kennedy home was set aside for his trophies.

A close family

The Kennedy family is close. The youngest, Linda, 6, who has normal hearing, answers the phone and mouths to her mother who is calling; the mother answers with her own voice and then Linda repeats for her lip-reading mother what the other party is saying. The oldest brother, Joseph, is a teacher in Waukegan.

It was about 11:30 a.m. Sunday — several hours after the fire — when an official at the Illinois School for the Deaf at Jacksonville called Mrs. Rossmann and said Bruce had been killed in the fire.

"I just couldn't go over and tell her," said Mrs. Rossmann. "Her husband was at church. So I called Joe in Waukegan and he came down."

Bruce had come to town with his schoolmates on the school's senior trip. He planned on going to Gallaudet College for the deaf in Washington, D.C., this fall.

The schoolmates were going to see the Chicago Bulls basketball team play the Detroit Pistons Sunday afternoon.

'My mother crying'

His mother had not known her son was in town.

In the afternoon, while the Kennedys had to go to Chicago to identify their son's body, Mrs. Rossmann took care of Linda Kennedy.

Linda did not know what was wrong.

But she said soon, "My mother was crying."

It was like that on Frontage Road Sunday in Morton Grove: sadness and a sharing of it. They had all lost a son.

2 killed, 36 injured in Hilton Hotel fire

Continued from Page 1

spread rapidly along a north-south corridor that ran the length of the huge hotel.

"Arson is under suspicion," said Quinn, but he said there was no evidence of arson immediately available. He estimated damage at $100,000.

The dead were identified as Bruce Kennedy, 17, of 8622 Frontage Rd., Morton Grove, and Donald Zanger, 17, of R.R. 4, Quincy.

Their bodies were found outside their room at the north end of the fire-ravaged corridor. They apparently died of smoke inhalation, according to Quinn.

Smoke inhalation

Most of the injured suffered smoke inhalation. Some students opened their doors and saw the smoke and closed them, ran to windows, and waited to be rescued. Some threw wet clothes over their faces to help them breathe.

The injured were taken to Mercy, Michael Reese, Wesley Memorial and Illinois Research hospitals. Most were released later after treatment. Those hospitalized were generally in good condition.

The Fire Department said it first received notification of the fire at 6:50 a.m. A 2-11 alarm was sounded at 7:12, and a 3-11 was called at 7:16. A 4-11 and 5-11 combined alarm — a rarity in Chicago fire-fighting —was sounded at 7:22, sending some 250 firemen to the hotel.

Rooms declared safe

The fire, which was brought under control by 8 a.m., blackened the walls of the corridor but did not damage the interiors of the rooms.

William L. Smith, general manager of the hotel, said in a statement, "If these fatalities had remained in their rooms, the deaths would not have occurred." Quinn said, "If everyone stayed in his room, we might not have had casualties."

Alan Edelson, director of public relations for the Conrad Hilton, said that when hotel officials learned of the fire, the occupants of ninth floor rooms were told by telephone to remain where they were.

Deaf children warned

Hotel operators then "called every occupant in the hotel, and when they completed that, they called them again," Edelson said. Hotel personnel members then helped in the evacuation of the hotel.

Edelson said more than half of the hotel's 2,262 rooms were occupied. Residents descended to the lobby via the hotel's staircases. Quinn said the hotel elevators were turned off for safety.

Asked how the deaf children were notified of the fire, Edelson said, "They knew what to do about fire. The group leaders had told each boy to stay in his room. They went to each room immediately."

The leader of the group, [illegible], said he was awakened at 7 a.m. by someone pounding on the door of his room. He said he called the assistant manager, who told him to stay in his room. [illegible] boys' names and the rooms where they were sleeping.

Lawrence T. Hunt, dean of students, told The Sun-Times from Jacksonville that the boys had arrived here Saturday and planned to return by bus to the school after the basketball game Sunday.

A Roman Catholic priest was summoned to communicate with the deaf students in sign language.

'Loaded with smoke'

The first Fire Department units to reach the scene were the 1st and 2d battalions. Chief John Murray of the 1st battalion said that when he arrived, the ninth floor was "loaded with smoke. Flames were shooting in the center lobby (on the ninth floor) around the elevators," where the furniture was stacked.

Quinn said the furniture was to have been sent out for reupholstering.

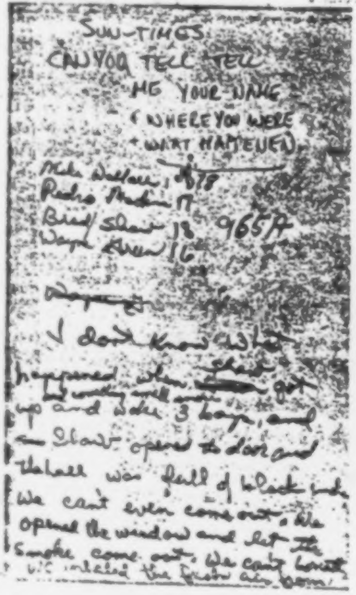
Murray said firemen found two boys trapped in a room. One of them was hanging from a ledge in the room. He was hauled to safety. The second "was standing on a windowsill and we grabbed him by his legs and pulled him in," Murray said.

An unidentified man was hurt when he jumped from his ninth-floor room. He fell four stories to the roof of a connecting building, firemen said.

"Firemen were trying to revive people by mouth-to-mouth resuscitation," Murray said.

Praise for the work of the firemen came

Turn to Page 24

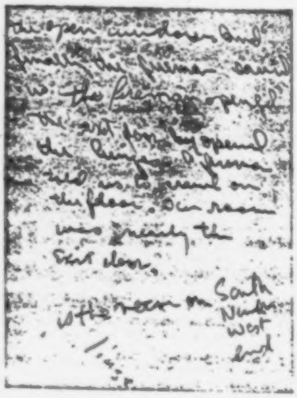


SUN-TIMES
CAN YOU TELL ~~TELL~~
ME YOUR NAME
(WHERE YOU WERE
+ WHAT HAPPENED)

Mike Wallace, 18
Pedro Medina 17
Brad Shaw 18 965A
Wayne Kuhn 16

~~[illegible]~~

I don't know what happened when Shaw got up and woke 3 boys, and Shaw opened the door and the hall was full of black smoke. We can't even come out. We opened the window and let the smoke come out. We can't breath. We inhaled the fresh air from [illegible]



[illegible] open windows and finally the fireman [illegible] the [illegible] opened the [illegible] fireman told us to stand on the floor. Our room was directly the first door.

[illegible] room on South North west end

Notes written by Illinois School for the Deaf students in answer to Sun-Times reporter James Campbell's questions (printed at top of note at left) concerning their experiences in Sunday morning's hotel fire.

Pg 3

Hilton fire

Survivors tell of evacuation

Two pajama-clad students from the Illinois School for the Deaf use hand signals to communicate after being rescued from fire on the ninth floor of the Conrad Hilton Hotel. (Sun-Times Photo)

Still in his pajama top, a youngster awakened by the fire sits on a piece of luggage in Conrad Hilton Hotel lobby. (Sun-Times Photo by Joe Kordick)

By David Anderson

It was his second time around, said Ken Kerr, [illegible], who is in the concrete business in Waukesha, Wis. He was sipping coffee with 70 or so other refugees from the Conrad Hilton Hotel fire Sunday.

"Yes," he said, "I was in the 1968 Conrad Hilton fire too. That time I was on the 11th floor, this time on the 21st."

The 70 or so persons had come from across the street and were munching rolls at tables without tablecloths in the Mayfair Room of the Sheraton-Blackstone Hotel. As somebody said, it isn't often people in their bedclothes get into the Mayfair Room.

Kerr and Mr. and Mrs. Floyd Wandsneider, also from Waukesha, had shared a 21st floor suite in the Hilton when the fire broke out. The Wandsneiders and Kerr were in Chicago for the annual National Ready-Mix convention, at the International Amphitheatre.

"The smoke woke me up," Kerr was saying. "I opened the door. I didn't see any fire but it was just solid smoke in the hall.

"I said, 'Oh, no, here we go again.' I was thinking of the other time when a friend opened the door and found it was burning on the outside. He closed it fast. What a traumatic experience!"

Kerr woke the Wandsneiders. Wandsneider's wife, Edith, threw a fur coat over her pajamas and bed robe and the three groped through the hall to the outside fire escape. The men managed to throw on sport jackets and slacks.

"We put wet towels on our faces and kept them there while we were in the smoke-filled hallway," said Mrs. Wandsneider.

As they went down the fire escape in a long line, nobody panicked.

"Everybody was polite," she said. "We stepped aside when the firemen came up the stairs."

Mrs. Virginia Anderson, of Columbus, Ohio, here with her husband, Ralph, for the Ready-Mix convention, was on the same fire escape. She said a man on the ninth floor, where firemen said the blaze started, had tied four bed sheets together and was preparing to let himself down from the window of his room.

"A fireman shouted to him not to jump and, I guess, he didn't," Mrs. Anderson said.

Kerr, sitting across the table, grinned and said: "He would have been a little short. I don't think the sheets would have taken him past the eighth or the seventh floor, so it's just as well he didn't jump."

The tension was gone. Kerr, still smiling, said he had gotten a red flannel nightgown for Christmas and planned to take it along to Chicago but, somehow, forgot it.

"Wouldn't I have been a sight going down the fire escape from the 21st floor in a red flannel nightgown?"

The others laughed.

A reporter asked if Kerr, veteran of two fires at the hotel, intended to stop at the Conrad Hilton again.

Rope ladder made of knotted bed sheets hangs from a ninth-floor window of Conrad Hilton Hotel. (Sun-Times Photo by Pete Peters)

"Sure," he replied. "Why not? Now I know where the axes are."

It was William Parsico's first fire and his first visit to the United States. Parsico, 31, a dark-haired, handsome man, was sitting at the same Mayfair Room table. He came from

Turn to Page 5

LIST OF THE DEAD, INJURED IN HILTON FIRE

Six persons remained hospitalized Sunday night as a result of the fire fatal to two at the Conrad Hilton Hotel. Twelve persons were treated in hospitals and released, and a number were treated for minor injuries in the hotel.

Here is a list of the victims:

Dead were Bruce Kennedy 17 of [illegible] of Quincy. Both were students at the Illinois School for the Deaf at Jacksonville.

Hospitalized were Charles Bright, 17, in good condition at Illinois Research Hospital with a fracture and lacerations; Scott Noyes, 14, and Thomas Byrnes, 15, both in satisfactory condition at Chicago Wesley Memorial Hospital from smoke inhalation, and Michael

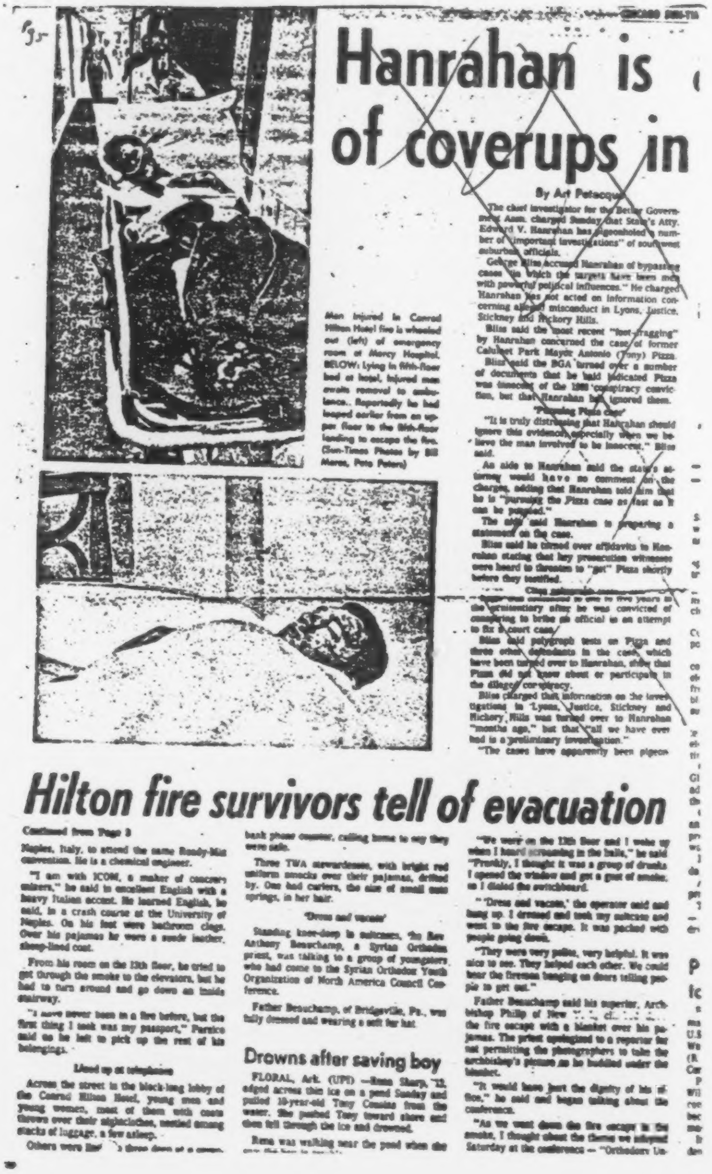
niel Thomas, 18, and Michael Ubowski, 14, all in fair condition at Mercy Hospital from smoke inhalation. Thomas also suffered burns.

All of those still hospitalized are students at the Jacksonville school.

Treated and released were:

Students Freeman Harper, 16, Albert Jones, 18, and David Reynolds, 16; Ralph Montgomery, 47; Katherine Montgomery 44; Richard Moore, 57; Willard Wagner, 37; and Rose Wagner, 36, all with smoke inhalation, and Gary Mendenhall, 26, hand laceration, at Mercy Hospital.

Students David Newcum 14, Mike Davis, 15, and Larry Peterson, 16, all with smoke inhalation at Illinois Research Hospital



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CHICAGO SUN-TIMES

~~Hanrahan is~~
~~of coverups in~~

~~By Art Petacque~~

~~The chief investigator for the Better Government Assn. charged Sunday that State's Atty. Edward V. Hanrahan has pigeonholed a number of "important investigations" of southwest suburban officials.~~

~~George Bliss accused Hanrahan of bypassing cases "in which the targets have been men with powerful political influences." He charged Hanrahan has not acted on information concerning alleged misconduct in Lyons, Justice, Stickney and Hickory Hills.~~

~~Bliss said the most recent "foot-dragging" by Hanrahan concerned the case of former Calumet Park Mayor Antonio (Tony) Pizza.~~

~~Bliss said the BGA turned over a number of documents that he said indicated Pizza was innocent of the [illegible] conspiracy conviction, but that Hanrahan has ignored them.~~

~~'Pursuing Pizza case'~~

~~"It is truly distressing that Hanrahan should ignore this evidence, especially when we believe the man involved to be innocent," Bliss said.~~

~~An aide to Hanrahan said the state's attorney would have no comment on the charges, adding that Hanrahan told him that he is "pursuing the Pizza case as fast as it can be pursued."~~

~~The aide said Hanrahan is preparing a statement on the case.~~

~~Bliss said he turned over affidavits to Hanrahan stating that key prosecution witnesses were heard to threaten to "get" Pizza shortly before they testified.~~

~~Cites polygraphs~~

~~Pizza was sentenced to one to five years in the penitentiary after he was convicted of conspiring to bribe an official in an attempt to fix a court case.~~

~~Bliss said polygraph tests on Pizza and three other defendants in the case, which have been turned over to Hanrahan, show that Pizza did not know about or participate in the alleged conspiracy.~~

~~Bliss charged that information on the investigations in Lyons, Justice, Stickney and Hickory Hills was turned over to Hanrahan "months ago," but that "all we have ever had is a preliminary investigation."~~

~~"The cases have apparently been pigeon-~~

Man injured in Conrad Hilton Hotel fire is wheeled out (left) of emergency room at Mercy Hospital. BELOW: Lying in fifth-floor bed at hotel, injured man awaits removal to ambulance. Reportedly he had leaped earlier from an upper floor to the fifth-floor landing to escape the fire. (Sun-Times Photos by Bill Mares, Pete Peters)

Hilton fire survivors tell of evacuation

Continued from Page 3

Naples, Italy, to attend the same Ready-Mix convention. He is a chemical engineer.

"I am with ICOM, a maker of concrete mixers," he said in excellent English with a heavy Italian accent. He learned English, he said, in a crash course at the University of Naples. On his feet were bathroom clogs. Over his pajamas he wore a suede leather, sheep-lined coat.

From his room on the 13th floor, he tried to get through the smoke to the elevators, but he had to turn around and go down an inside stairway.

"I have never been in a fire before, but the first thing I took was my passport," Persico said as he left to pick up the rest of his belongings.

Lined up at telephones

Across the street in the block-long lobby of the Conrad Hilton Hotel, young men and young women, most of them with coats thrown over their nightclothes, nestled among stacks of luggage, a few asleep.

Others were lined three deep at a common bank phone counter, calling home to say they were safe.

Three TWA stewardesses, with bright red uniform smocks over their pajamas, drifted by. One had curlers, the size of small auto springs, in her hair.

'Dress and vacate'

Standing knee-deep in suitcases, the Rev. Anthony Beauchamp, a Syrian Orthodox priest, was talking to a group of youngsters who had come to the Syrian Orthodox Youth Organization of North America Council Conference.

Father Beauchamp, of Bridgeville, Pa., was fully dressed and wearing a felt fur hat.

"We were on the 12th floor and I woke up when I heard screaming in the halls," he said. "Frankly, I thought it was a group of drunks. I opened the window and got a gust of smoke, so I dialed the switchboard.

"'Dress and vacate,' the operator said and hung up. I dressed and took my suitcase and went to the fire escape. It was packed with people going down.

"They were very polite, very helpful. It was nice to see. They helped each other. We could hear the firemen banging on doors telling people to get out."

Father Beauchamp said his superior, Archbishop Philip of New York, climbed down the fire escape with a blanket over his pajamas. The priest apologized to a reporter for not permitting the photographers to take the archbishop's picture as he huddled under the blanket.

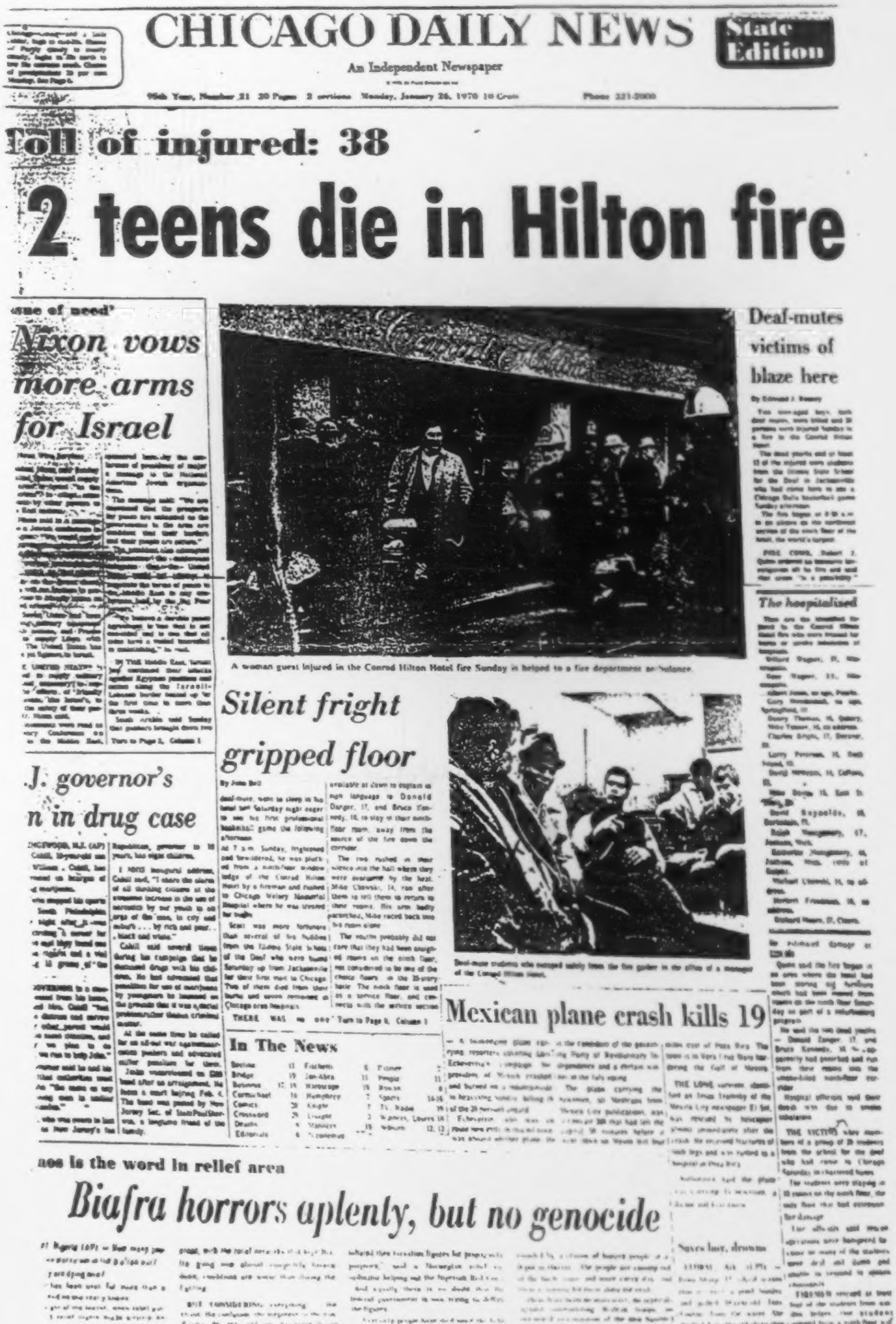
"It would have hurt the dignity of his office," he said and began talking about the conference.

"As we went down the fire escape in the smoke, I thought about the theme we adopted Saturday at the conference — "Orthodoxy Un-

Drowns after saving boy

FLORAL, Ark. (UPI) —Rena Sharp, 12, edged across thin ice on a pond Sunday and pulled 10-year-old Tony Cousins from the water. She pushed Tony toward shore and then fell through the ice and drowned.

Rena was walking near the pond when she [illegible]



CHICAGO DAILY NEWS

State Edition

An Independent Newspaper

Toll of injured: 38

2 teens die in Hilton fire

Nixon vows more arms for Israel

A woman guest injured in the Conrad Hilton Hotel fire Sunday is helped to a fire department ambulance.

Deaf-mutes victims of blaze here

The hospitalized

Silent fright gripped floor

J. governor's n in drug case

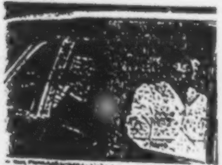
Mexican plane crash kills 19

In The News

noe is the word in relief area

Biafra horrors aplenty, but no genocide

Unheard disaster



Mayor Richard J. Daley with his son, John, rushed to the scene on learning of the fire in the Conrad Hilton Hotel Sunday morning. He commended the fire department for a "fine job."

A desperate moment of life and death—mouth-to-mouth resuscitation in ninth-floor corridor of the Conrad Hilton Hotel. The picture was one of several of this kind taken, and photographer was unable to say whether the youth was one of those who was saved or one who died. Two youths, members of a group of 41 from the Illinois School for the Deaf in Jacksonville, were killed in the fire. Thirty-eight persons were injured.

[illegible], who was injured when he jumped from a [illegible] window ledge, lies on bed in hotel room waiting for ambulance for removal to a hospital. Firemen rescued at least four of the students from window ledges. Many of the guests fled down fire escapes to safety.

eacher's view

'Deaf fear fire most'

[illegible] teacher of the Illinois [illegible] for the Deaf at Jacksonville [illegible] Monday that fire is [illegible] deaf persons fear [illegible]

[illegible] said John Borsnes, who accompanied the deaf [illegible] to Chicago for a weekend [illegible]

[illegible]

GRIEF-STRICKEN [illegible] boys killed in the Conrad Hilton Hotel fire — Bruce Kennedy, 18, of 600 Frontage [illegible], and Donald [illegible], 17, of Quincy, Ill.

[illegible]

Bruce Kennedy

[illegible] for the deaf.

KENNEDY was only partly deaf, as are his parents, Mr. and Mrs. David Kennedy, [illegible]

[illegible]

Waukegan. He told the [illegible] about the fire.

"THE DEAF BOYS are no different from any other kids their age," Borsnes said. "They are just silent."

The older boys found it especially hard to tell what they had seen and heard during the fire. Borsnes said one of the worst moments came when TV newsmen cornered the boys for interviews.

"I guess they have a job to do, too," he said.

THE BOYS broke into [illegible] Sunday after the fire when the Rev. James V. Egan came to talk with them.

Father Egan's hands speak the deaf mute's language and it was a relief from the newsmen who [illegible] at them and failed to relate to them with [illegible].

Father Egan is a priest [illegible] Chicago [illegible] and had been [illegible]

[illegible]

Rev. James V. Egan

[illegible]

AFTER THE fire the boys were taken to rooms in the Palmer House. [illegible]

[illegible]

'Minor' Hilton violation cited

Continued from Page 1

rooms that were involved with construction work which was in the hotel, he said.

FIRE COMR. Robert J. Quinn ordered an arson investigation, saying: "We haven't ruled out arson. Arson is a possibility."

Police and fire department investigators were investigating an altercation between deaf-mute students and a [illegible] of exchange students Saturday night.

Quinn said his probe was meant to determine whether the incident could have been serious enough to lead to arson.

POLICE SAID the altercation occurred on the seventh floor where the exchange students were staying, when deaf youths tried to flirt with a girl exchange student.

A youth who was a member of the exchange contingent shouted at the deaf youths. Police said there apparently was a lot of [illegible] were struck.

[illegible]

[illegible] were staying during a weekend outing in Chicago.

Killed were Bruce Kennedy, 18, of 600 Frontage Rd., Morton Grove, and Donald [illegible], 17, of Quincy, Ill.

The fire department's arson unit, headed by Chief George Schuller, was interviewing [illegible] and hotel officials Monday in an attempt to determine the cause of the fire, which did an estimated $150,000 damage.

A HOTEL clerk telephoned the fire department at 6:30 a.m. to report the fire and within 12 minutes five alarms had been sounded, bringing 40 pieces of fire equipment and more than 200 firemen to the scene.

Elevators were not operating and hundreds of guests fled down stairwells in the [illegible] room hotel.

Others were assisted down fire department ladders or climbed down ropes made from bed sheets. Many clung to ledges until firemen could reach them.

The blaze spread rapidly along a north-south corridor on the ninth floor and [illegible] to upper floors.

THE BODIES of the two deaf students were found in [illegible] corridor. [illegible] said the two apparently panicked and [illegible] their rooms and [illegible] into the smoke-filled corridor.

Another of the boys, Charles Bright, 17, of Mascoutah, Ill., suffered a fractured right knee cap and fractured ankle when he leaped from a window of his ninth-floor room to a [illegible].

His condition was listed "good" Monday in [illegible] Illinois Hospital.

Five others, all students at the Illinois School for the Deaf, remained hospitalized Monday.

[illegible]

Hilton victims

Two persons were killed and 38 injured in the Conrad Hilton Hotel fire.

The dead

Bruce Kennedy, 18, [illegible]

[illegible]

Hospitalized students

[illegible]

[illegible] Thomas, 18, [illegible]

[illegible]

Others injured

[illegible] Montgomery [illegible]

[illegible]

Hilton fire tragedy

Mayor Richard J. Daley with his son, John, rushed to the scene on learning of the fire in the Conrad Hilton Hotel Sunday morning. He commended the fire department for a "fine job."

Richard Moore, a hotel security guard, who burned his hand while trying to rescue some of the guests, tells fireman that he found the ninth floor black with smoke as he was making his rounds.

2 teens killed in Hilton blaze

Continued from Page 1

been making his rounds Sunday when he found the ninth floor black with smoke.

"I couldn't see a thing," he said. "People were coughing, gagged and screaming. I tried to help some of them out, and burned my arms."

THE 2,400-room hotel was about half occupied when the fire broke out.

William L. Smith, the hotel manager, said switchboard operators made two calls to every hotel guest advising them to leave their rooms.

Since electric power had been shut off, guests were forced to flee down stairwells and fire escapes.

Although flames were confined to the ninth floor, the smoke was evident throughout the hotel.

At least three dozen guests fled across the street to the Sheraton-Blackstone Hotel in night clothes and blankets.

One guest, Marjorie King, of Milwaukee, went down the fire escape from her 12th floor room dressed in shortie pajamas and a mink coat.

She said she stuffed the pockets of her coat with jewelry.

Other guests lined up at the front desk waiting to check out as soon as the fire was extinguished.

MAYOR Richard J. Daley arrived at [illegible] a.m. after being called at home by fire officials.

He was guided through the fire area by Quinn, who said the mayor had been "extremely concerned" and wanted to make sure everything possible was being done for the injured.

Police quickly sealed off the ninth floor and at one point prevented even Quinn from entering the floor.

Quinn said his arson bureau and the police bomb and arson bureau would investigate the blaze

Silence and fright gripped 9th floor

Continued from Page 1

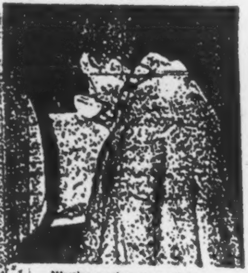
of the hall where the fire started.

THE BOYS were four to a room and occupied 10 of the 110 rooms on that floor. Ranging in age from 13 to 19 years, they had made a visit to the Museum of Science and Industry with their two advisers Saturday.

[illegible] of the dead youths and 26 other hotel guests were burned or injured in the panic and confusion. All but one of the hotel's elevators halted when power was cut off and the hotel's [illegible] the scene of a [illegible]

HOURS AFTER the fire the lobby desk was crowded with ruffled guests who had decided to return home or switch hotels. Coffee stations were set up throughout the hotel.

William Reese, 52, down the hall for the [illegible] said Sunday that he was startled by the smoke and decided to stick his head out his [illegible] until firemen could rescue him.



Wasting no time, many of the guests fled to safety in night clothes and blankets. Some found shelter in the Sheraton-Blackstone Hotel across the street where they were served coffee.

GRAND BALLROOM

Guests mill about the lobby of the hotel after evacuating their rooms.

Complete Stock Tables for Computing State Income Tax **SEE TODAY'S FINANCIAL SECTION**

The American Paper for Americans
Chicago Tribune
THE WORLD'S GREATEST NEWSPAPER
SPORTS ★★★★ FINA
[illegible] © 1970 Chicago Tribune
MONDAY, JANUARY 26, 1970
76 PAGES, 6 SECTIONS 10¢

2 DIE IN HILTON HOTEL FIRE

PRESS PLANE CRASHES IN MEXICO; 19 DIE

Newsmen on Vote Campaign Trip

POZA RICA, Mexico, Jan. 25 (UPI) — A twin-engine plane filled with reporters covering [illegible] Echeverria's campaign for president of Mexico crashed and burned on a mountainside in heavy fog today, killing 18 of the 20 persons aboard.

Echeverria, who was en route to a rally in this oil town, was aboard another plane which was not involved in the disaster. He is the candidate of the governing Party of Revolutionary Institutions and appears certain winner in the July [illegible]

All Newsmen Mexicans

The plane carrying the newsmen, all Mexicans from Mexico City publications, was a Convair 340 which had left the capital 50 minutes before it went down on Blanco hill four miles east of Poza Rica. The town is in Vera Cruz state bordering the Gulf of Mexico.

Barry Bishop, The Tribune's Latin America correspondent stationed in Mexico City, said in a telephone conversation yesterday that he was not invited to make the press trip. "If I had been invited, I would have accepted," Bishop said. "I'm glad I wasn't."

The lone survivor, identified as Jesus Tramsky of the Mexico City newspaper El Sol, was rescued by helicopter almost immediately after the crash. He received fractures of both legs and was rushed to a hospital in Poza Rica.

Reuters news agency in a dispatch from Mexico City said a Mexican news agency later reported that Tramsky had died from his injuries.

Chartered by Party

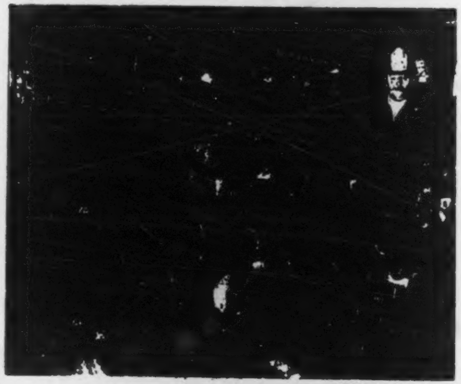
Authorities said the plane was carrying 15 newsmen, a doctor tentatively identified as Camelo Diaz, and 4 crewmen. It had been chartered by Echeverria's political party. There were 15 others of varying sizes in a caravan accompanying Echeverria.

Witnesses said the plane was circling for a landing at Poza Rica's airport when it crashed. The plane first hit a row of trees at the very top of the hill, shearing off branches. One wheel was wrenched from the craft. Then it nosed down, hit

(Continued on page 5, col. 4)

Scenes of the Fire

Boys from Illinois School for the Deaf wait in lobby after fire in Conrad Hilton hotel where two died and 39 were injured. Boys were taken to hospital moments later.



(TRIBUNE Staff Photo by [illegible])

Firemen in ruined 9th floor lobby of hotel after early morning blaze.

39 Injured, Hundreds Flee $150,000 Blaz

BY MICHAEL KILIAN

Like all disasters, it had come suddenly.

In one terrible moment of fear and panic the fire in the Conrad Hilton hotel had burst into the lives of hundreds of people, bringing death to two and forever scarring the memories of the many who survived.

It was over now. Outside, in an early morning rain the survivors stood in bathrobes and raincoats, watching as the firemen finished their work.

Bed Sheet Ropes Seen

Glass fell. A rain that was not rain but dirty water from the burned out floors above came down. Broken windows were like jagged wounds in the building's grimy facade. From one a rope of bed sheets dangled. There were other open windows without such ropes.

Police cars stood at the corner, their blue Mars lights rotating furiously against the misty background of Grant park. From somewhere on the other side of the building, an ambulance siren began to shriek, the sound diminishing as it sped away.

"We can go in now," some one said.

Lobby, Halls Jammed

They crowded the lobby and the halls, and the staircases, standing uncomfortable or sitting or lying exhausted on the rug. A bellman shouted instructions thru a loudspeaker. Waiters pushed rattling carts thru the mob handing out cups of coffee. Queues began to form by the registration desk as people barefoot and in slippers asked to check out.

Others clustered around the public telephones, shouting at operators in Indiana and California and New York. One man who had waited several minutes, found the phone would not work and banged on it with his fist.

One Is Bloodied

They wandered up and down the main hall in twos or threes or all alone, a few smiling, most of them not. One couple, the man brooded, the woman with long dark hair held a Poodle and talked to it reassuringly as tho it were a baby.

A heavy set man leaned against the wall holding his head. It was bloody. A girl wearing an open fur coat and a short nightgown reached into

(Continued on page 2, col. 3)

Mayor Daley visits fire scene. He is followed by Robert Quinn, fire commissioner.

Youth Tells of Soundless Fear in Fire

BY ROBERT NOLTE

A 17-year-old boy awoke yesterday morning in the Conrad Hilton hotel with smoke filling his lungs. Terrified, he tried to cry out but David Newcom, partly deaf and mute, could scarcely whimper.

The curly haired youth from the little town of Cullom, 90 miles south of Chicago, and 41 of his mute friends learned in those few terrible minutes how to fight for life without saying a word. Two of his comrades perished in the early morning hotel fire.

Wet Towels Used

The boy told how he and friends, tears streaming from their eyes, leaned from open windows trying to gasp for fresh air.

David, who has learned to

(Continued on page 2, col. 4)

[Pictures on back page.]

A 5-11 alarm fire swept the 9th and 10th floors of Conrad Hilton hotel yesterday morning, killing two guests, injuring at least 39 and forcing hundreds to flee.

Killed were two students at a school for deaf students in Jacksonville, [illegible] miles west of Springfield. Ten other male students were among the injured.

Damage to the hotel, the world's largest, was estimated at $150,000. No cause was determined. An arson investigation was ordered by Fire Commissioner Robert Quinn.

Starts in Storeroom

The fire started in a storage lobby on the building's 9th floor and spread quickly thru the halls. It was two years and a day ago another fire had started on hotel's 9th floor.

More than 300 firemen, [illegible] pieces of equipment, including 4 snorkel units and [illegible] ambulances, were called before the fire was out.

Extensive smoke damage was reported in the upper stories of the 11 story, 2,000 room structure. Water damage was heavy in floors beneath the 9th.

Elevators ceased to function moments after the blaze began, forcing many of the hotel's guests to flee via fire escapes or use smoke filled wells; others clung to ledges or climbed down ropes made from bed sheets.

One of the injured, Charles Bright, 17, another deaf student, jumped from his 9th floor room to a terrace [illegible] stories below. He is in satisfactory condition.

Victims Are Identified

The dead students were identified as Donald Zenge of rural Sparta, and [illegible] Kennedy, [illegible] Morton Grove.

They were found in a corridor of the ninth floor of the hotel where all of the students from the Illinois School for the Deaf in Jacksonville were staying. They were among 41 students from the school who were on a tour to Chicago.

Firemen said they had difficulty removing the students from their rooms because they could not hear instructions.

John Rainey of the fire department investigation [illegible]

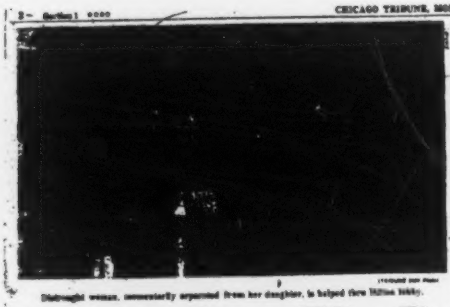
(Continued on page 2, col. [illegible])

THE WEATHER
MONDAY, JANUARY 26, 1970
CHICAGO AND VICINITY

B.G.A. Blasts Hanrahan in

Inside....

Nixon Hints More Israel Ai



[TRIBUNE Staff Photo]

Distraught woman, momentarily separated from her daughter, is helped thru Hilton lobby.

2 Killed, 39 Hurt in Hilton Fire

[Continued from first page]

and firemen were assisted by Father James Egan, of St. Ignatius church, [illegible] Loyola av., a fire department chaplain who has worked for years with deaf children.

Bailey said from 8 a.m. yesterday until almost 6 p.m. Father Egan and the members of the investigation bureau talked with the children, both at the hotel and at hospitals. Bailey said because of Father Egan's help, all of the students were relatively calm in their recollections of where they were and what happened.

[illegible] Assistant Commissioner [illegible], who was joined by Mayor Daley in an inspection of the building after the fire, attributed the low death toll to the orderly manner in which residents evacuated the building. Mercy, Illinois Research, and other nearby hospitals had put disaster plans into effect, anticipating many dead and injured.

Survivors said they received telephone calls from the hotel switchboard warning them of the blaze, and told of an [illegible] bellman who went from door to door awakening guests. The first alarm to the [illegible] was pulled at 8:26 a.m.

Others said they were awakened by firemen who gave them gas masks and led them to safety.

Later, a spokesman for the hotel said management operators attempted to call each room [illegible] to warn guests of the fire. Many guests had already left the rooms, he said.

He said the damage was not as severe as it first seemed and attributed the orderly evacuation of the hotel to the fact that the flames did not spread.

The spokesman said the hotel does not have an alarm bell because "if there is an alarm, people are likely to run to the elevators or [illegible] in a rush." All of the elevators were [illegible]

[illegible] of Orlando, Fla., said he was awakened by [illegible] outside his 14th-floor [illegible]. He said he looked out his window and saw nothing but smoke. He fled down the fire escape.

Many Take Shelter

Capt. John Murray of the 1st fire battalion, one of the first on the scene, said he rescued seven of the deaf mute students from ledges outside their rooms.

One couple said they used an inside staircase and had to step thru a broken door.

Leonard E. [illegible] of San Antonio, [illegible] National Ready Mixed Concrete association convention in the hotel, said he tried calling the switchboard for help but could get no answer. He was rescued by firemen, he said.

Many of those evacuated from [illegible] shelter in the Sheraton-Blackstone hotel, across the street from the fire, or stood behind police lines.

They were permitted to return after the fire was out but were kept on the building's first floor. The guests were allowed to retrieve belongings from their rooms, many complained that police guarding stairways would let no one pass without a room key. They complained that they had not paused to take their room keys when they fled the fire.

Elevators were out of commission for several hours after the blaze was extinguished at 9:10 a.m. Guests returning to their rooms used stairways, including one elderly man who climbed to the 22d floor.

Many guests checked out of the Hilton as soon as it was permitted, transferring to other hotels in the Loop area.

Most of the injuries were from smoke inhalation or from cuts from broken glass. At least 100 tanks of oxygen were used to revive victims, according to a fire ambulance supervisor, Joseph McCarthy.

The fire was first reported to the hotel switchboard by the occupants of two rooms on the 8th floor. The fire was concentrated in the northwest corner of the hotel, where the Jacksonville students were staying.

No emergency traffic plan was employed because of the small amount of traffic in the streets. Michigan and Wabash avenues, however, were blocked off from Jackson boulevard to 8th street.

Many of those at the hotel were stewardesses and other air line personnel unable to reach their flights in time.

In the 1968 fire, three persons were injured but there were no fatalities.

Long a center for political and industrial conventions, the Hilton was built in 1927 as the Stevens hotel. It was used as an army barracks during World War II.

[TRIBUNE Staff Photo]

Mr. and Mrs. Daniel P. Wheat Sr. sit with the junior Daniel Wheats in lobby after fleeing from their rooms.

Hilton Survivors Tell of Flight from Flames, Praise Firemen

BY JOE MORANG

Dan Wheat Jr. thought he was on his way to safety when he and his wife and parents got on an elevator on the 14th floor of the Conrad Hilton hotel and began to descend to the ground floor.

"But then the elevator stopped on the 8th floor, and when the door opened, all we could see were flames and huge clouds of smoke," the Beaumont, Tex., man said.

After their brief glimpse into terror, however, the elevator doors closed and the elevator brought them down into the crowded lobby to safety.

Wheat said he had been awakened in his room by his father, who had heard the sirens and quickly gathered up belongings to escape.

"It was a good thing he called because the hotel didn't notify us about what was going on," the younger Wheat said.

On the 8th floor, where the fire took its main toll, Mr. and Mrs. Kenneth Korwin of Utica, N. Y., were awakened from their sleep shortly after the fire began.

"I heard somebody, I think it may have been a bellboy, going thru the corridor and knocking on doors, yelling at guests to wake up and telling them there was a fire," Mrs. Korwin said.

The Korwins, two of several persons who were in the hotel attending the national convention of the National Ready Mixed Concrete association, commended the "brave firemen" of Chicago who led them from their rooms to the stairwell.

"I could see them swinging axes to get doors open," Mrs. Korwin said. "They deserve all the credit in the world."

In the lobby, guests, wearing coats over their nightclothes, told other stories of their experiences in escaping the fire.

SUDDEN PANIC, TERROR JOLT HOTEL GUESTS

Survivors Left Dazed by Hilton Fire

[Continued from first page]

her pocket and pulled out a handful of jewelry. She began to laugh hysterically.

An open door led to a stairway and the sounds of rescue. Firemen, carrying axes and poles and lights, climbed rapidly up it, past others coming down. Two air line stewardesses in red coats followed, their hair still wet.

On a landing, a man who must have been 60 leaned against the rail, resting, chewing on the butt of a cigar. "My room's up on the 22d floor," he said. "That's a way to go."

A Scene of Confusion

The stench from the burning increased with the climb. At the 8th floor it was as thick as dust, the floor in the corridor seeming the entrance to some strange mine. Firemen crowded thru it, the beams of their flashlights flickering across their sooty faces and the blackened walls. Underneath was a muck of dirt and cinder soaked with water. Every few paces was an open door.

Some of the rooms had been spared, but were littered with the signs of flight, overturned chairs, torn sheets and covers, open suitcases, and abandoned clothing. On one dresser, someone had left a large amount of money. On another was a woman's shoe.

The corridor turned and then widened, opening to the left to a large space faced on three sides by elevators. In its midst was a pile of burned and twisted furniture, a blackened lamp.

Deaf Mute Students

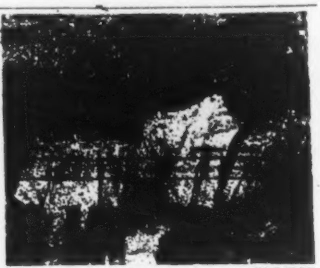
The two who had died on the 8th floor were teen-age boys from a school for deaf mutes in Jacksonville, Ill. They had been unable to hear the alarm.

Their school-mates were still in the lobby, huddled together, confused and frightened, speaking to one another with silent, moving fingers.

Nearby, a woman shouted, and, pushing her way past several firemen, threw herself into the arms of a man. He was her husband. He had been missing for only half an hour, but in the Conrad Hilton yesterday morning, that was a very long time.

TEACHERS MAP BLITZ IF HEW BILL IS VETOED

Washington, Jan. 25 (AP)—Hundreds of school teachers, principals, librarians and school equipment manufacturers planned to descend on Congress tomorrow in a campaign aimed at overriding President Nixon's expected veto of the 19.7 billion dollar housing, education, and



[TRIBUNE Staff Photo]

Mike Davis [from left], Larry Peterson, and David Newcom, deaf youngsters trapped by Hilton fire, after treatment at University of Illinois hospital.

Boy, 14, Tells of the Soundless Terror at Hilton Hotel Blaze

[Continued from first page]

spoke haltingly despite his hearing loss, told of wet towels being passed from window to window so survivors could suck air thru towels into their lungs.

"I learned there is oxygen in water," said David. "Other people [not deaf children] tried to help us by giving us the towels. The windows are so close together. I told my two friends, using hand signs, next door to breathe in the towels and that would help them."

With a faltering voice marked by fear, young David told how his roommate, Charles Bright, 17, also of the school for the deaf in Jacksonville, Ill., was so terrified he wrenched the curtain rod and rammed it thru the glass window.

He Leaps Out Window

"Then he jumped onto the window [sill] and looked at me. He was crying but he couldn't say anything. He jumped and there was no sound until he hit," said David.

Bright fell five floors onto a small terrace. Firemen broke out windows to get a stretcher to him. He was taken to the University of Illinois hospital with an ankle fracture and face cuts.

Sign Language Interview

Two of David's friends staying in the next room told how they tried to summon help by groaning and making sounds into the telephone. They never got an operator on their room phone.

A Tribune reporter was able to talk with David, who in turn "spoke" to two other boys by using sign language. Thru this method, a story of the boys' ordeal was learned.

"We were sleeping. Most of us were pretty tired.

He Hears Screaming

"I smelled the smoke and it was dangerous to smell. I screamed out and swallowed a big mouthful of that bad smoke. I thought I was going to be killed. My roommate, Chuck, woke up and started running around the room. Once he crawled under the bed to get away from the smoke.

"I can't hear very well, but I heard screaming coming from outside our room. And people running up and down the halls.

"My friends next door, Larry Peterson [16, of Rock Island] and Mike Davis [15, of East St. Louis] hung out the windows sucking air from the wet towels when the firemen came. They took me out in a stretcher because I was all black from the smoke.

"Mike and Larry would breathe in fresh air, then leave the window and start tying sheets and towels together. When they couldn't hold their breath any longer, they would go back to the window. The firemen got to Larry and Mike before they got the ladder finished."

The young boys will have sore throats for several days. But the real hurt of their ordeal was revealed when young Mike told his friend David in sign language: "I will always be afraid."

Walgreens
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CAFETERIAS
STATE & MADISON • STATE & RANDOLPH
MONDAY SPECIAL
MEAT BALLS &
Creole Spaghetti
With oven-fresh roll and butter ... AND a choice of coffee, tea or milk.
The Most Complete!
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The pick of the season

Jet away to sun and fun with this charming bag in hand. You'll be properly in the swing when you step off the plane. Or, choose it now for later, it's a delightful find. An excellent 8 by 6" size, roomy enough to hold many things you need, it is an envelope-basket style woven of practical vinyl wicker—with vinyl lining and zipper pocket. Decorated with fresh white organza daisies with bright yellow beaded centers and velvety green leaves. It is [illegible] in your choice of

HARDSHIP NOT NEW IN DEAD YOUTH'S HOME

Parents, Brother Handicapped

BY [illegible] AND PHILIP CAPUTO

Hardships are not new to the family of Bruce E. Kennedy, [illegible] deaf student who [illegible] yesterday in the Conrad [illegible] hotel fire. Mr. and Mrs. David E. Kennedy, the parents, [illegible]

[illegible]

Mrs. Kennedy said she had not known her son was in Chicago on the annual senior trip of students in the Illinois School

Bruce E. Kennedy

for the Deaf in Jacksonville. She first heard of her son's death from a neighbor who had heard early accounts on the radio.

"I didn't believe it," she said. "It always happens to other people. I didn't know he was here. He probably would have written next week to tell me of the trip. It's a big thrill for those kids."

Planned on College

A son, Joseph G., 20, a member of children with impaired hearing, said his brother planned to attend Gallaudet college, a school for the deaf in Washington.

Mr. and Mrs. Robert Zenger Sr., parents of the other victim, had just returned from mass at St. John's Catholic church in Quincy, Ill., when they received a phone call from Dr. Kenneth Magnuson, superintendent of the Jacksonville school.

Dr. Magnuson told the Zengers, of rural route 6, Quincy, that their son Donald, 17, a senior at the school for the deaf, was missing in the hotel fire.

"We expected the worst," Mr. Zenger said. At the time of the phone call, he was in the kitchen with his wife, Elizabeth, a 16 year old son, Michael, and a daughter, Rose Marie, 19, who also attends the Jacksonville school.

He called his other five sons and one daughter to the house.

Robert Jr., 20, the eldest son, called the hotel for further details. The hotel referred him to the police.

Didn't Have to Tell

"The police said that Donald's body was in the morgue," Robert Jr. said. "I didn't have to tell my parents. They saw it on my face that Donald was dead."

Robert Jr. added that his brother had been deaf from birth.

"Before his class went to Chicago he told us how excited he was. He had never been to Chicago before," Robert Jr. said.

(TRIBUNE Staff Photo)

A Happier Moment for Boys

Singer Connie Stevens, appearing at Empire Room, with boys from the Illinois School for the Deaf at a dinner party which was held to help take their minds off of Conrad Hilton hotel fire tragedy.

Deaf Fear Fire Most: Teacher

Fire is the thing a deaf person fears most, said a man who survived yesterday's Conrad Hilton hotel blaze.

Bebe Berounek, 35, is in a position to know. As a teacher in the Illinois School for the Deaf at Jacksonville, he led a group of 41 deaf boys to Chicago, but when he leaves today, only 39 will return with him.

Berounek and his students had come to the city to see, among other things, the Museum of Science and Industry on the annual senior trip.

Panic Is Explained

They were sleeping on the 8th floor of the Hilton when the fire broke out in an elevator lobby on the 9th floor and spread quickly thru the halls.

(TRIBUNE Staff Photo)

Bebe Berounek

"A deaf person can smell and see smoke, but he panics because he realizes that he won't be able to hear anyone trying to help him," Berounek said.

When Berounek first awakened, he tried to go out into the hall, but was driven back. "I closed the door and hung out the window—a lot of the boys were doing the same thing, and I told them in sign language to stay where they were," Berounek said.

Two Students Panic

While most of the boys did as they were told, at least two panicked and ran out in the hall.

"I haven't told any of the boys about the death of their classmates," Berounek said. "That will be done this morning," he said.

Berounek said the annual trip is meant to be a reward for excellence at the state school.

He said the decision as to whether the trip will be made again will be decided later. "I am exhausted," he said, "and anyway the actual decision will have to be made by the Illinois Department of Children and Family Services which runs the school."

Praises Police, Firemen

For Berounek, the day was filled with visits to the six students still in Mercy hospital, and with a trip to the morgue to identify the two dead students.

"I want to say one thing about the Chicago fire and police departments," he said. "Both have provided me with help and transportation all day. If anyone says they're not the best, I'll be ready for a fight."

Berounek and his students have been housed in the Palmer House free of charge since the fire. They were treated to dinner last night in the Empire room and a visit from singing star Connie Stevens.

Chronology of Alarms in Hilton Blaze

John Casey, 1st division fire marshal, gave the following chronology of alarms that were sounded yesterday in the Conrad Hilton hotel fire.

[illegible] a. m.—A hotel clerk alerted the 1st battalion by telephone. This was a still alarm because no fire alarm box was pulled, Casey said.

7:02 a. m.—John Murray, 1st battalion chief, arrived at the hotel and sounded the first alarm. Seconds later he sounded the second alarm.

7:16 a. m.—A deputy fire marshal sounded the third alarm and immediately the urgency of the fire was realized.

7:32 a. m.—The blaze was declared a 5-11 alarm.

Casey said that each time an alarm was sounded five more engines were sent to the scene. He said a total of 35 trucks with five men each, six hook and ladder engines with five men each, and additional squads totaling about 50 men brought the total of firemen at the scene to more than 300.

London Police Clash With War Protesters

LONDON, Jan. 25 (UPI)—Mounted police clashed with about 2,000 anti-Viet Nam war demonstrators tonight outside the residence of Prime Minister Harold Wilson, Scotland Yard said. Three policemen were slightly injured and 10 demonstrators arrested.

List of the Dead and Injured in Conrad Hilton Hotel Fire

A list of the dead and injured in yesterday's Conrad Hilton hotel fire follows:

DEAD

Donald Zenger, 17, rural route 6, Quincy.

Bruce Kennedy, 17, of 8632 Frontage rd., Morton Grove.

INJURED

Treated in Mercy Hospital

Michael Tanner, 16, of Lombard, smoke inhalation.

Gary Mendenhall, 20, of Springfield, head laceration.

Freeman Harper, 18, of 201 W. State st., Jacksonville.

Ralph Montgomery, 47, of Jackson, Mich., smoke inhalation.

Katherine Montgomery, 44, of Jackson, Mich., wife of Ralph, smoke inhalation.

Daniel Thomas, 18, of 420 Oak st., Quincy.

Michael Ubowski, 16, of 2707 Fletcher st., smoke inhalation.

Richard Moore, 37, of Cicero, smoke inhalation.

David Reynolds, 16, of rural route 7, Kankakee.

Albert Jones, 18, of 511 W. 4th st., Peoria.

Fireman John O'Hara, 30, of Chicago, ankle cut.

Willard Wagner, 27, of Minneapolis, smoke inhalation.

Rose Wagner, 26, of Minneapolis, wife of Willard, smoke inhalation.

Treated in Wesley Memorial Hospital

Scott Noyes, 14, of rural route 1, Findlay, Ill.

Thomas Byrnes, 17, of Kirkwood, Ill.

Treated in University of Illinois Hospital

Charles Bright, 17, of 120 E. Cherry st., [illegible], Ill.

Larry Peterson, 18, of 2520 22d av., Rock Island.

Michael Davis, 15, of East St. Louis, smoke inhalation.

David Newsom, 16, of [illegible], Ill.

About 20 others were treated in the hotel for minor injuries.

Hospital spokesmen said all but six of the injured had been released by early last night. The six are Tanner, Thomas, Ubowski, Noyes, Byrnes, and Bright.

All were reported in good or satisfactory condition.

NEWS Briefs

BY PHILIP CAPUTO

Big Snow Anniversary

Chicagoans recovering from the recent cold wave might do well to remember that today is the third anniversary of the great blizzard, which dumped a record 23 inches of snow on the city in a 29-hour period. It appears that the city will escape a similar fate this year. 35 degree temperatures are predicted, with only a 30 per cent possibility of precipitation.

Boy Found Dead on Rails

[illegible], 12, of 2400 N. [illegible] av., was found dead yesterday on the [illegible] elevated tracks 200 feet north of the [illegible] avenue station. His body was found by a CTA inspection car crew at 5 a. m. A CTA spokesman said young [illegible] apparently died of electrocution.

Dog Bags Theft Suspect

[illegible] Bonner, 21, of 2700 Federal st., found out yesterday that he was no match for a police dog named Bravo. Bonner was cornered in a gangway behind 2722 Wabash av., after he was chased by Policemen James Murphy and James Humphrey, and their two dogs, Bravo and Spot. Bravo sank his teeth into Bonner's upper leg. He was held as an auto theft suspect.

Woman, 80, Gets Degree

Mrs. Lena Sherman, 80, worked 11 years to get her B. A. degree from Roosevelt university. It was finally bestowed on her yesterday at Roosevelt's [illegible] commencement exercises. Now that she has her degree, Mrs. Sherman wants a job. "And I won't take no for an answer," she said. "I get social security and a supplementary budget from the Cook county department of public aid, but it's not enough to live on."

Attention, Pet Owners!

The Anti-Cruelty society is warning pet owners that premature spring fever and a desire to be free may stir their animals into wandering from home. J. J. Shaffer, director of the society, said this condition is caused in household pets by the homing instinct and the frustration of being cooped up inside during [illegible] temperatures. Shaffer cautions pet owners to make sure there is proper identification on their pets' collars.

Deadline for Aliens

W. G. Polk, acting director of the immigration and naturalization service, said aliens have until Saturday to report their addresses to the United States attorney general's office. Federal law requires aliens to report their whereabouts every January, Polk said.

Postal Auction Is Set

Postmaster Henry W. McGee said that more than 1,000 unclaimed and slightly damaged articles will be auctioned at [illegible] a. m. tomorrow in Room 620 of the post office annex, 300 W. Harrison st. The merchandise, which includes stereo components, dry goods, books and household appliances, has accumulated in the post office, McGee said.

Awards for Slogans

The 21st annual traffic safety slogan contest begins tomorrow. United States savings bonds worth $900 and 24 honorable mention awards are the prizes available to Chicago high school students with the most original and legible slogans. The contest closes Friday.

Burglars Hit Evanston

Evanston police are investigating two burglaries which occurred late Saturday [illegible] and early yesterday morning in the suburb. Jerome B. Rosenthal, 38, of 125 Dobson st., reported that burglars took a $2,000 [illegible] coat and over $4,000 in jewels and [illegible] items from his home after they broke a rear window. Early yesterday morning Julius Goldberg, 45, of 1720 South [illegible], reported burglars broke thru his front [illegible] and took a $2,500 ocelot coat and [illegible] jewelry.

The Best Anti-Freeze in Town!

FURS

Lytton's

Juniors ... check into this

Jumper and Blouse Duet

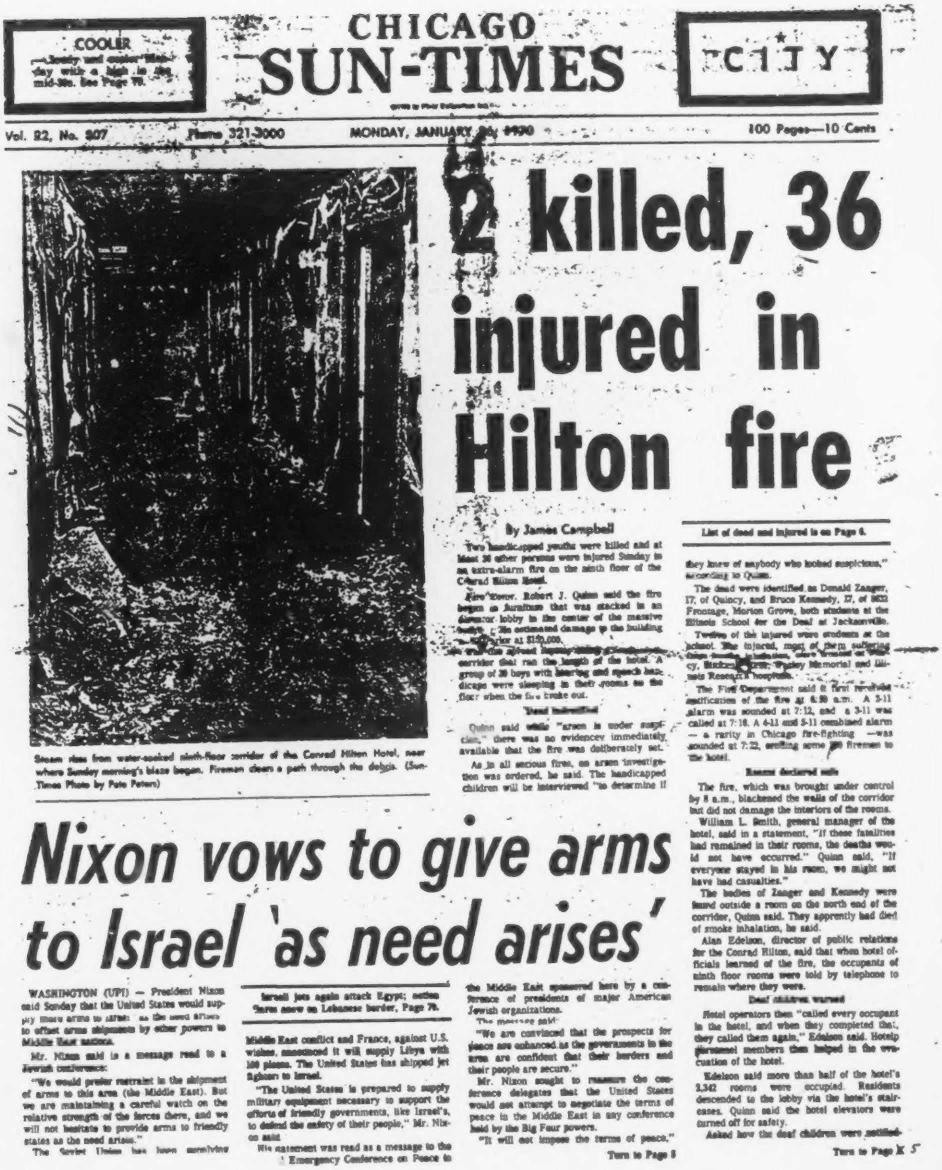
by Briarwood

Button up the look that's Springtime fresh with our star checked wrap jumper of bonded

BONWIT TELLER STORE HOURS:
Chicago: Monday 10:00 am to 7:00 pm, Tuesday through Saturday 9:30 am to 5:30 pm
Oakbrook: Monday, Thursday and Friday 9:30 am to 9:30 pm, Tuesday, Wednesday and Saturday 9:30 am to 5:

Bonwit's says,
Vacation in sleek chic
with Dynathigh!

Making legway on the fairway and the beach:
the great leglines that can be yours
so effortlessly with Dynathigh,
a vibrant addition to the Dynatone body
of electronic exercisers dedicated to reducing your
heaviest problems. Even disciplined
exercising can't keep pace
with the steady, gentle impulses which Dynathigh
sends out to firm, tone, and shape thigh muscles.



COOLER
—Sunny and cooler Monday with a high in the mid-30s. See Page 79.

CHICAGO
SUN-TIMES
[illegible]

CITY

Vol. 22, No. 207 Phone 321-3000 MONDAY, JANUARY 26, 1970 100 Pages—10 Cents

2 killed, 36 injured in Hilton fire

Steam rises from water-soaked ninth-floor corridor of the Conrad Hilton Hotel, near where Sunday morning's blaze began. Fireman clears a path through the debris. (Sun-Times Photo by Pete Peters)

By James Campbell

List of dead and injured is on Page 6.

Two handicapped youths were killed and at least 36 other persons were injured Sunday in an extra-alarm fire on the ninth floor of the Conrad Hilton Hotel.

Fire Comr. Robert J. Quinn said the fire began in furniture that was stacked in an elevator lobby in the center of the massive hotel. He estimated damage to the building and interior at $150,000.

He said the fire spread [illegible] corridor that ran the length of the hotel. A group of 20 boys with hearing and speech handicaps were sleeping in their rooms on the floor when the fire broke out.

Dead identified

Quinn said while "arson is under suspicion," there was no evidencev immediately available that the fire was deliberately set.

As in all serious fires, an arson investigation was ordered, he said. The handicapped children will be interviewed "to determine if they knew of anybody who looked suspicious," according to Quinn.

The dead were identified as Donald Zanger, 17, of Quincy, and Bruce Kennedy, 17, of 8822 Frontage, Morton Grove, both students at the Illinois School for the Deaf at Jacksonville.

Twelve of the injured were students at the school. The injured, most of them suffering from smoke inhalation, were treated at Mercy, Michael Reese, Wesley Memorial and Illinois Research hospitals.

The Fire Department said it first received notification of the fire at 6:30 a.m. A 2-11 alarm was sounded at 7:12, and a 3-11 was called at 7:16. A 4-11 and 5-11 combined alarm — a rarity in Chicago fire-fighting —was sounded at 7:22, sending some [illegible] firemen to the hotel.

Rooms declared safe

The fire, which was brought under control by 8 a.m., blackened the walls of the corridor but did not damage the interiors of the rooms.

William L. Smith, general manager of the hotel, said in a statement, "If these fatalities had remained in their rooms, the deaths would not have occurred." Quinn said, "If everyone stayed in his room, we might not have had casualties."

The bodies of Zanger and Kennedy were found outside a room on the north end of the corridor, Quinn said. They apprently had died of smoke inhalation, he said.

Alan Edelson, director of public relations for the Conrad Hilton, said that when hotel officials learned of the fire, the occupants of ninth floor rooms were told by telephone to remain where they were.

Deaf children warned

Hotel operators then "called every occupant in the hotel, and when they completed that, they called them again," Edelson said. Hotelp personnel members then helped in the evacuation of the hotel.

Edelson said more than half of the hotel's 2,342 rooms were occupied. Residents descended to the lobby via the hotel's staircases. Quinn said the hotel elevators were turned off for safety.

Asked how the deaf children were notified

Turn to Page 5

Nixon vows to give arms to Israel 'as need arises'

WASHINGTON (UPI) — President Nixon said Sunday that the United States would supply more arms to Israel as the need arises to offset arms shipments by other powers to Middle East nations.

Mr. Nixon said in a message read to a Jewish conference:

"We would prefer restraint in the shipment of arms to this area (the Middle East). But we are maintaining a careful watch on the relative strength of the forces there, and we will not hesitate to provide arms to friendly states as the need arises."

The Soviet Union has been supplying Middle East conflict and France, against U.S. wishes, announced it will supply Libya with 100 planes. The United States has shipped jet fighters to Israel.

Israeli jets again attack Egypt; action flares anew on Lebanese border, Page 79.

"The United States is prepared to supply military equipment necessary to support the efforts of friendly governments, like Israel's, to defend the safety of their people," Mr. Nixon said.

His statement was read as a message to the [illegible] Emergency Conference on Peace in the Middle East sponsored here by a conference of presidents of major American Jewish organizations.

The message said:

"We are convinced that the prospects for peace are enhanced as the governments in the area are confident that their borders and their people are secure."

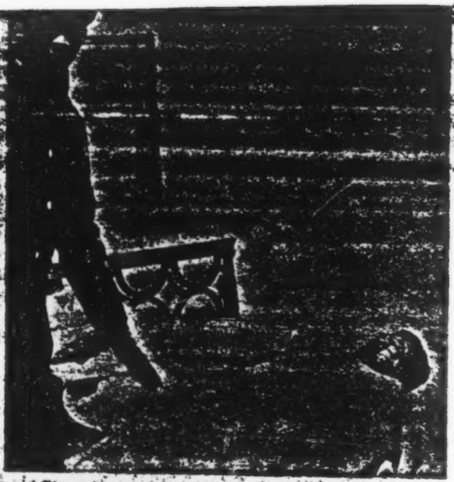
Mr. Nixon sought to reassure the conference delegates that the United States would not attempt to negotiate the terms of peace in the Middle East in any conference held by the Big Four powers.

"It will not impose the terms of peace,"

Turn to Page 8

P35

Two pajama-clad students from the Illinois School for the Deaf use hand signals to communicate after being rescued from fire on the sixth floor of the Conrad Hilton Hotel.



A Chicago policeman stands by an injured man waiting for removal to an ambulance from the Conrad Hilton hotel's fifth floor. He apparently had earlier leaped from a higher floor to the fifth floor landing to escape the fire.

2 die, 36 injured in hotel fire

Continued from Page 1

of the fire, Edelson said, "They knew what to do about fire. The group leaders had told each boy to stay in his room. They went to each room immediately."

The leader of the group, John Barczak, said he was awakened at 7 a.m. by someone pounding on the door of his room. He said he called the assistant manager, who told him to stay in his room.

Barczak said he gave firemen a list of the boys' names and the rooms where they were sleeping.

Lawrence T. Hunt, dean of students, told The Sun-Times from Jacksonville that the youths came to Chicago to watch a Sunday afternoon basketball game between the Chicago Bulls and the Detroit Pistons.

The boys arrived at the hotel Saturday and planned to return by bus to the school after the basketball game, Hunt said.

A Roman Catholic priest was summoned to communicate with the deaf students in sign language.

'Loaded with smoke'

The first Fire Department units to reach the scene were the 1st and 2d battalions. Chief John Murray of the 1st battalion said that when he arrived, the ninth floor was "loaded with smoke. Flames were shooting in the center lobby (on the ninth floor) around the elevators," where the furniture was stacked.

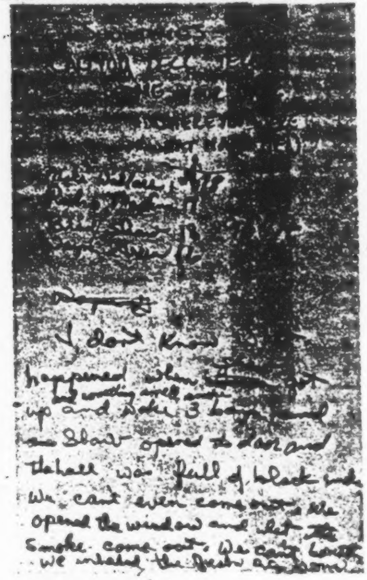
Turn to Page 6

Rope ladder made of bed sheets hangs from a sixth-floor window of the Hilton Hotel.

Man injured in the Hilton Hotel fire is wheeled out of emergency room at Mercy Hospital. (Sun-Times Photos by Pete Peters and Bill [illegible])

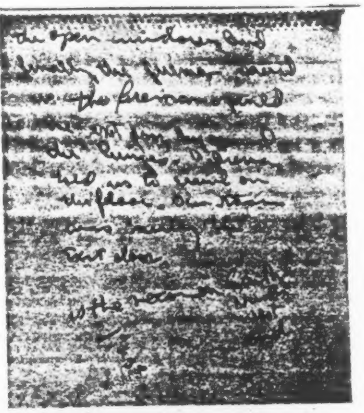
CHICAGO SUN-TIMES, Mon., Jan. [illegible], 1970 pg 3

Pg 3



I don't know
happened when [illegible] got
up and [illegible] 3 [illegible]
[illegible] opened the door and
the hall was full of black smoke
We can't even come out. We
opened the window and let the
smoke come out. We [illegible]
we inhaled the fresh air [illegible]

Notes written by Illinois School for the Deaf students in answer to Sun-Times reporter James Campbell's questions (printed at top of note at left) concerning their experiences in Sunday morning's hotel fire.



the open window and
[illegible]
[illegible] the firemen came [illegible]
[illegible]
[illegible] us to stand on
the floor. [illegible]
[illegible]
exit door
[illegible] the [illegible]

Hilton fire

Survivors tell of evacuation

By David Anderson

It was his second time around, said Ken Kerr, 60, who is in the concrete business in Waukesha, Wis. He was sipping coffee with 70 or so other refugees from the Conrad Hilton Hotel fire Sunday.

"Yes," he said, "I was in the 1968 Conrad Hilton fire too. That time I was on the 11th floor, this time on the 21st."

The 70 or so persons had come from across the street and were munching rolls at tables without tablecloths in the Mayfair Room of the Sheraton-Blackstone Hotel. As somebody said, it isn't often people in their bedclothes eat in the Mayfair Room.

Kerr and Mr. and Mrs. Floyd Wandsneider, also from Waukesha, had shared a 21st floor suite in the Hilton when the fire broke out. The Wandsneiders and Kerr were in Chicago for the annual National Ready-Mix convention, at the International Amphitheatre.

"The smoke woke me up," Kerr was saying. "I opened the door. I didn't see any fire but it was just solid smoke in the hall.

"I said, 'Oh, no, here we go again.' I was [illegible] outside. He closed it fast. What a traumatic experience!

'Everybody was polite'

Kerr woke the Wandsneiders. Wandsneider's wife, Edith, threw a fur coat over her pajamas and bed robe and the three groped through the hall to the outside fire escape. The men managed to throw on sports jackets and slacks.

"We put wet towels on our faces and kept them there while we were in the smoke-filled hallway," said Mrs. Wandsneider.

As they went down the fire escape in a long line, nobody panicked.

"Everybody was polite," she said. "We stepped aside when the firemen came up the stairs."

Mrs. Virginia Anderson of Columbus, Ohio, here with her husband, Ralph, for the Ready-Mix convention, was on the same fire escape. She said a man on the ninth floor, where firemen said the blaze started, had tied four bed sheets together and was preparing to let himself down from the window of his room.

"A fireman shouted to him not to jump and, I guess, he didn't," Mrs. Anderson said.

Kerr, sitting across the table, grinned and

Students from the Illinois School for the Deaf at Jacksonville, hands covered with